CULTURAL
RESOURCES
INFORMATION
MANAGEMENT
SERIES

Geographic Information Systems Use In State Government Agencies

U.S. Department of the Interior
National Park Service
Cultural Resources

Geographic Information Systems Use in State Government Agencies

September 1990

by Lisa Warnecke, GeoManagement Associates
Edited by Gretchen E. Hayes, National Conference of State Historic Preservation Officers

Cultural Resources Information Management Series
Betsy Chittenden, series editor

Interagency Resources Division
National Park Service
P.O. Box 37127, Stop 413
Washington, D.C. 20013-7127
(202/FTS) 343-9500

INTERAGENCY RESOURCES DIVISION PROGRAMS:

* National Register of Historic Places
* Cultural Resources GIS Applications Center
* Preservation Planning
* Certified Local Governments
* Historic Preservation Fund Survey & Planning Activities
* State Program Review
* Cultural Resources Information Management Coordination
* National Register Information System (NRIS)
* Micronesian Historic Preservation Program
* Native American Tribal Preservation Program
* American Battlefield Protection Program

FOREWORD

Geographic Information Systems (GIS) technology is rapidly appearing in planning and operations offices at all levels of government. The ability of this technology to deal with information in map form strongly enhances and expands the opportunity for planners and decision-makers to visualize the reality of a current situation, or the future consequences of a possible action.

The uses of such technology are steadily expanding as experience is gained with solving practical problems. Historic preservation operations rely heavily on spatial or map information; and survey management, planning, review and compliance, and other activities stand to benefit significantly both in their quantity and quality from GIS. In a very real sense, the uses and benefits for historic preservation from GIS at this time are limited only by our imaginations.

At a practical level, acquiring the training, equipment, and spatially referenced data needed to take effective advantage of GIS technology still are major costs that few in historic preservation can tackle independently. Fortunately, the widespread use of GIS in State and local governments provides an opportunity for many State and local historic preservation programs to enter into cooperative arrangements with existing GIS operations.

These arrangements generally involve providing spatially-referenced historic preservation data (such as inventory data, construction project locations, National Register properties, tax act projects, areas surveyed, and so on) as additional map layers for the host GIS system, and thereby gaining access to use of the system and the map layers it may already contain (such as environmental and demographic information). Such access can significantly reduce SHPO inventory maintenance costs in many cases.

To aid State programs in initiating such contacts, the Interagency Resources Division contracted with Lisa Warnecke in January, 1990, to perform a survey to identify the principal GIS operations in each State government and to prepare a brief summary about the nature of the system, who is the operator, and other facts that would facilitate State Historic Preservation Officers and even Certified Local Governments making contact with these organizations.

For further information on Geographic Information Systems applications in historic preservation programs, contact the Cultural Resources GIS Facility, Interagency Resources Division, National Park Service.

Lawrence E. Aten
Chief, Interagency Resources Division

Author's Acknowledgements

Many thanks to state officials and the National Park Service for their contributions to this document and other efforts to improve communications among state officials and others working with geographic information. State officials have assisted by providing information not only about their states, but also by preparing transcripts of meetings and providing information about their own comparisons of states. Collected individual state information and related documents serve as a base for a valuable clearinghouse for states and others. The contributions and support of the National Park Service's Cultural Resources GIS Applications Center was a significant help to this effort. Many thanks are offered to the staff of this office, and particularly John Knoerl for his initiative and support.

Lisa Warnecke
GeoManagement Associates

About this Publication

This document was prepared from materials and information collected from each of the 50 states and two territories. The author's information on GIS in state and local governments, collected since 1985, was supplemented by information from telephone conversations with state officials to produce this publication. Information in this document is current as of March, 1990. The results of this effort will also be included in the "State Geographic Information Activities Compendium" to be published by the Council of State Governments in late 1990. The CSG publication will have updated and more detailed information. For further information, contact the Council of State Governments, Mr. John Johnson, Iron Works Pike, P.O. Box 11910, Lexington, KY, 40578-1910.

ALABAMA

Department of Economic and Community Affairs (Running the GIS system)
Planning and Economic Development Division
3465 Norman Bridge Road
P.O. Box 250347
Montgomery, AL 36125-0347
Contact: Ralph W. Ainsworth, Natural Resources Planner
(205) 284-8915

Department of Industrial Relations (Statewide GIS coordination)
Planning and Systems Analysis Division
Industrial Relations Building, Room 521
Montgomery, AL 36130
Contact: Joseph (Pat) Bigelow
(205) 242-5397

Technology Infrastructure

The Department of Economic and Community Affairs (ADECA) is currently using ERDAS software on an IBM PCAT with two workstations. They are also obtaining PC ARC/INFO software. ADECA has been working with GIS since the late 1970s. ADECA is developing GIS for its use, and is building a statewide GIS for other agencies as well, but it is a low level of effort in general, with no dedicated staff.

Coordination Activities

The Director of the Department of Industrial Relations (DIR, a Labor Department) took a recent interest in GIS because it was thought there might be some application in the Abandoned Mine Reclamation program which is in this department. The ADECA has its own GIS as well as a statewide GIS but with few resources or dedicated staff. ADECA and DIR are working together. At this time, DIR is assuming a lead role regarding statewide coordination. It sponsored an "Alabama GIS Conference" in November, 1989 and 90 people attended.

During this time, the Alabama GIS Advisory Council has been developing under the coordination of DIR. The Council is starting its work as an informal "grass roots" GIS staff level activity that will reflect the goals of upper management, and eventually work up in the state organization. It is planned that representatives to the Council will include all levels of government, academia and the private sector.

ALASKA

Dept. of Natural Resources, Division of Management
Land Records Information Section
3601 C Street, Suite 916
Anchorage, AK 99503
Contact: Dianne Lyles, Director
(907) 762-2393

Technology Infrastructure

The Department of Natural Resources (DNR) has the most GIS activity in the state. It has four systems, the first of which was established in 1977. Two systems are in the Land Records Information Section of the Division of Management. Major uses of GIS include land use planning and resource allocation, analyzing development alternatives and potential for land settlement, timber harvest, sale offerings, land trades and management of state lands. The Valdez oil spill is currently the main focus of activity. The planning oriented system operates ARC/INFO software on Data General equipment and a SUN network. They are also using AutoCAD software. The other large system at the Land Records Information Section in DNR is called the Automated Drafting System (ADS). ADS is a Synercom system operating on DEC equipment. The Synercom system is used for land ownership and land status mapping, including state and federal surveys. The Synercom and ARC/INFO systems have recently begun sharing data.

Also in the DNR, the Division of Oil and Gas is using GIS Cogniseis for seismic processing on a MicroVAX, and Data General for in-house programming. Since 1983 the U.S. Geological Survey has had a Geochemical Data Modeling System developed in-house. Other state agencies, including Fish and Game, and Environmental Conservation, also have GIS capabilities.

Coordination Activities

Efforts have been growing to build coordination between state agencies, especially in the aftermath of the Valdez oil spill. A GIS Task Force was appointed during the 1990 legislative session and will be chaired by someone from legislative affairs. Virtually all state agencies will be invited to participate. The purpose of the GIS Task Force is to exchange information, and to potentially do joint projects and share data.

As much as anything, the oil spill helped bring things together between the DNR, the Department of Environmental Conservation, and the Department of Fish and Game who are also GIS users. The DNR is responsible for pulling together information for the spill mitigation. The state also has an active ARC/INFO user group, and a URISA chapter which meet regularly. They helped sponsor the State Surveying and Mapping conference held the first week of February, 1990.

ARIZONA

State Land Department
Land Resource Information System
1624 West Adams
Phoenix, AZ 85007
Contact: Gary Irish, ALRIS manager
(602) 542-4061

Technology Infrastructure

The State Land Department has served as the lead state agency for GIS since 1984, after a legislative study concluded this was the best location for a statewide system, including facilities and services. The Resource Analysis Division was established in the State Land Department with the mission to design, develop, and implement a statewide GIS, which became known as the Arizona Land Resource Information System (ALRIS). From 1984 to 1987 the Resource Analysis Division developed the necessary technology, and expertise with ALRIS to expose agencies to GIS with training, consulting, and conducting applications projects. Several agencies began using ALRIS, and others purchased their own information systems. ALRIS currently uses ARC/INFO software on a Prime 6350 computer that is shared with the rest of the State Land Department. Remote sensing and image processing are done as well. An Ethernet network will be installed on the Prime to link with personal computers.

Coordination Activities

Statewide GIS coordination needs are largely met by ALRIS as was envisioned in its original design. It is a statewide program with the following activities:

- Database development and maintenance.
- Digital geographic data clearinghouse.
- GIS software development.
- GIS facility development and maintenance.
- GIS training and consulting.

In 1988, the legislature adopting a bill stating that the Resource Analysis Division shall "Establish a Clearinghouse of Information and a central repository for map and imagery products and digital cartographic data. . . .(and) Prepare standards and specifications for developing and producing cartographic and aerial photographic products and GIS."

An active State Mapping Advisory Committee (AZMAC) was established by Executive Order in 1979. The state also had a State Geographic Names Board that was established by executive order in 1982. In October 1988 the Governor signed an executive order to establish the Arizona Geographic Information Council that canceled both the AZMAC and Names Board Executive Orders. The Arizona Geographic Information Council was built on the requirements established by statute, and "shall function to coordinate the management of statewide geographic information and serve as an advisory council to the Arizona State Land Department to provide guidance and direction in the management of a state GIS." This group is functioning accordingly.

ARKANSAS

Governor's Office
Natural and Cultural Resources
State Capitol
Little Rock, AR 72201
Contact: Kenneth Smith, Special Assistant
(501) 682-2345

Soil and Water Commission
Suite 2D
1 Capitol Mall
Little Rock, AR 72201
Contact: John Sweeney
(501) 682-2962

Technology Infrastructure

The Soil and Water Conservation Commission in 1988 began a three year cooperative project with Water Resources Division (WRD) of the U.S. Geological Survey. The main focus of the Commission is to work on 1:100,000 data development, inasmuch as the state is just getting started in GIS. WRD is using ARC/INFO in its Little Rock office, and an employee is on detail at the Soil and Water Conservation Commission with a terminal linked back to the WRD computer system. John Sweeney is the GIS coordinator at this office.

Coordination Activities

Coordination activities in Arkansas have just begun from the standpoint of state government. The Arkansas chapter of URISA is an informal group that meets regularly to serve in a coordination role. Various federal agencies in the area also work together informally. There are no immediate plans to have an official coordinating group or effort. However, the Governor's office sponsored a meeting in July 1989 to provide an opportunity for state and federal agencies, local governments and universities to meet and discuss activities.

CALIFORNIA

Teale Data Center
P.O. Box 13436
Sacramento, CA 95813-4436
Contact: Nancy Tosta, GIS Manager
(916) 924-2278

Technology Infrastructure

The Teale Data Center is the largest multipurpose data center in the state. In 1988 the director decided to develop a GIS unit due to the growing amount of GIS activity in state agencies. Teale had ARC/INFO software installed on a Prime computer, but they wanted to be on UNIX-based machines to increase connectivity. Now that some demo equipment has been installed, they are procuring for workstations. There are some plans to develop a statewide Ethernet LAN network to link agencies with each other and Teale. Many agencies work with Teale including those who do or do not have GIS installations of their own.

Coordination Activities

The Teale Data Center provides many services on a cost recovery basis, but it essentially aims to serve in a strong coordination role. Services at Teale include consulting services, database development, education (classes in ARC/INFO), lease purchase, address matching, and data maintenance. One of the main goals at Teale is to develop a data library.

California does not have any official groups dedicated to GIS. An informal Computer Mapping Coordinating Committee began in 1987 which meets on a monthly basis. The Committee now includes federal, state and local agencies, and academic members. It is essentially a users group and exists for information exchange. Members provide some guidance and assistance for each other. Nancy Tosta is the chair.

The California GIS Coordinating Committee is a small task force organized for the sole purpose of inventorying all GIS activities in the state and developing some type of plan. It is also very informal with only volunteer efforts. The Committee hopes to prepare a report of state, federal and local GIS activities by April 1990. Nancy Tosta is the chair of the Committee.

A State Mapping Advisory Committee exists according to the U.S. Geological Survey, but it hasn't been active in GIS or in general.

COLORADO

Department of Local Affairs
Division of Local Government
1313 Sherman, Room 520
Denver, CO 80203
Contact: Marv Koleis, Cartographer
(303) 866-3463

Technology Infrastructure

Colorado began work with Geographic Information Systems (GIS) in the late 1970s. The largest GIS is currently in the Department of Local Affairs (DLA) which has had ARC/INFO software since 1984. DLA is currently operating ARC/INFO software on the department's main computer, a Prime 9750 computer. The system's main function is to support redistricting, and it is now also used to maintain local government and special district boundaries; to support property tax mill levy assessments; and to allocate Conservation Trust Fund monies received from the state lottery by local governments.

Coordination Activities

Colorado has a long history of coordination activities regarding GIS. The state previously had a cartographer who accomplished significant data development activities, but the position was abolished in the mid 1980s. The director of the Department of Highways (DOH) established a full time Geographic Information Coordinator position for statewide coordination activities but without official statewide direction, authority or resources. The Geographic Information Coordinator position included staffing for a "Governor's Forum on Geographic Information" Conference held in October 1987, but the effort slowed down later that year with the departure of both the DOH director and the Coordinator. During this time, however, an informal group of persons from state agencies interested in and working with GIS began meeting, and a Geographic Names Board was also organized.

Since then, this group of state agency representatives drafted and presented the Governor's office with an Executive Order to improve the support and direction of the group. An Executive Order was signed in October 1989 establishing the Colorado Geographic Information Coordinating Committee. The Committee is lead by the Department of Local Affairs and has various state agencies as voting members. The Committee does not have any real authority, but it is a forum for exchange of information. The Order states that the responsibilities of the Committee are to:

- promote a spirit of cooperation among all sectors;
- develop recommendations to state and federal agencies;
- establish or recommend guidelines for interchange of data among state agencies;
- advise the U.S. Geological Survey;
- promote coordination and minimize duplication;
- provide a contact point and rudimentary clearinghouse for local governments and private entities with GIS concerns;
- provide recommendations to the Governor on issues related to geographic information;
- report to the governor once a year.

CONNECTICUT

Natural Resources Center
Department of Environmental Protection
165 Capitol Avenue, Room 553
Hartford, CT 06106
Contact: Sandy Prisloe, Manager
(203) 566-3540

Technology Infrastructure

The Department of Environmental Protection's (DEP) Natural Resources Center is the home of the vast majority of GIS work in the state. The Natural Resources Center is responsible for maintaining environmental and natural resource information for use by the rest of the Department of Environmental Protection. The mission of the Natural Resources Center is to inventory related systems and information and explain the relationship between them for the use of scientists, the public and decision makers.

The GIS was installed in 1986 after a successful project demonstration, named MYSTIC, with the U.S. Geological Survey. The Natural Resources Center runs ARC/INFO software on a Data General MV10000 which is the department-wide computer. The Center also has PC ARC/INFO software and is acquiring some SUN workstations. One of the main uses for GIS is research on water quality and the preservation of potable water supplies. The goals of the system are to develop a standardized digital cartographic database that can be used by DEP, municipalities, and other state and federal agencies, as well as to provide technical support and application development.

Coordination Activities

While DEP has had department-wide GIS activity underway for some time, statewide coordination has just begun in earnest. Policies were adopted last year within DEP which include that "Digital mapping standards must be adopted and consistently used to insure the integrity and quality of the Connecticut Standardized Digital Cartographic Data Base." Digital Line Graph (DLG) data has been adopted as a standard. DEP stated that the Natural Resources Center will also serve as the central clearinghouse for distribution of the database, and the database user community should support and develop the database and GIS maintained by the Center.

An informal group of state agency representatives involved with GIS has been meeting regularly to develop a strategy for statewide coordination. The State Mapping Advisory Committee is being revived to respond to the need for coordination. To date, there have been parallel efforts in different agencies. The current goal of the Advisory Committee is to act as a forum for information exchange to aid in understanding activities that make the existing data more useful. The Natural Resources Center has been working and exchanging files with some utilities.

DELAWARE

Office of the Budget
Office of Planning Systems Development
801 Silver Lake Blvd
Dover, DE 19901
Contact: Richard E. Collin
(302) 736-9621

Technology Infrastructure

The Department of Natural Resources and Environmental Control (DNREC) and the U.S. Environmental Protection Agency have a cooperative project called the "Multimedia Advance Identification System for Delaware's Inland Bays" (MAIS). DNREC operates ARC/INFO software on a Tektronix workstation. The MAIS project was initiated in 1986, and installed in 1988. The goal of the project is to develop an advance identification system for the inland bays watershed which consists of 13 quad maps. This pilot project will provide a planning tool for state coastal managers to accurately assess impacts of proposed land and water use projects on natural resources in the inland bays. DNREC plans to adapt the system for statewide application in the future, but the inland bays are top priority now. The pilot project is for one quad, the Frankfort quad, which will be used as the "show case quad" to demonstrate the value of having many layers of data.

Coordination Activities

The Office of Information Systems (OIS) has been involved in helping coordinate statewide GIS activities since 1987. This office conducted an initial assessment of conditions in the state and continues to be involved in coordination efforts. The Office of Information Systems also provided some funding for studies, translation software, and training. The Office of Information Systems has organized and held informal coordination meetings with representatives of DNREC, DOT, Agriculture, Public Safety and the state Geological Survey. This informal GIS Committee meets once each quarter. The Committee was started in 1987 and was strong in the beginning with more frequent meetings. Without direction and assistance from top officials, there has been less enthusiasm to continue at this level of activity.

In 1988 the Office of Information Systems had recommended that a Standards Committee be organized and composed of members of the interagency committee. The focus was to be on policies, standards and procedures, but it didn't have the support needed from the leaders of state government and was never organized.

FLORIDA

Governor's Office of Planning and Budget
Growth Management Data Network Coordination Council
411 Carolton Building
Tallahassee, FL 32399
Contact: David Stage, Staff Assistant
(904) 488-8686

Technology Infrastructure

The Department of Natural Resources Marine Research Institute initiated GIS activities in 1980 for marine resources. The Institute runs ARC/INFO, ERDAS and ELAS software on a Gould minicomputer and personal computer workstations. The Institute is also participating in a project directed by the Governor's Office to develop a "Model Geographic Information System for Coastal Zone Management." This project will "develop model requirements for a Geographic Information System to facilitate coordination through computer-assisted information sharing among various agencies responsible for coastal zone management at the local level." The pilot project area is the Little Manatee River Watershed, and most of the project is funded by the National Oceanic and Atmospheric Administration (U.S. Department of Commerce) with participation by the state departments of Natural Resources, Environmental Regulation, Community Affairs, the Tampa Bay Regional Council, the Southwest Florida Water Management District and the counties of Hillsborough, Manatee and Pinellas. Some of these and other state government entities have some in-house GIS capabilities.

Coordination Activities

In response to increasing growth in the state, the state legislature created the Florida Growth Management Data Network Coordinating Council in 1985. Members of the Council are policy level appointees of the directors of state agencies. The Council was created to coordinate and promote interagency and intergovernmental sharing of data and information that are required to respond to growth management issues. The legislation specifically states that its role is to:

- Promote the sharing of data related to growth management.
- Promote consistency of data elements related to growth management.
- Adopt common data elements and formats for interagency transmission of growth management data.
- Prevent the duplication of effort associated with the collection of growth management data.

The Council concluded that geographical information is critical to managing growth and is a common link for interagency and intergovernmental decision making. GIS is the focus and framework for the execution of the Council's overall mission.

The Council has a Staff Advisory Committee that was chosen by the members of the Council. It prepares recommendations and conducts much of the work for the Council. Work groups have been established with members of this committee and other agency employees to help prepare standards and functional data sets and categories, as well as to develop information to be included in the Spatial Data Directory which will available in 1990.

The Council members signed an interagency agreement, effective on September 1, 1989, to meet the requirements stated in the statute. The terms of the agreement were that a database structure and architecture would be maintained according to standards to be adopted by June 1990. Formal Spatial Data Transfer Specifications (SDTS), which provide that all data sets in the Florida Digital Spatial Data Base System will follow the SDTS that is currently proposed, are expected to be established by the U.S. Geological Survey and the National Institute of Standards and Technology (U.S. Department of Commerce). Informal Spatial Data Transfer methods can be used when SDTS is not possible or appropriate. If used, Informal Spatial Data Transfer methods should be done with AutoCAD software that can produce DXF, DLG, or band interleaved by line, or band sequential by line, formats for raster data. Proposed standards for GIS include recommended standards to be considered as "exemplary principles to guide the execution of tasks pertaining to planning, geodetic referencing, surveying, mapping and base map development for GIS." Agencies were directed to work together to assess proposed standards by June 30, 1990.

During 1989, the Council designed a statewide GIS, the "Florida Digital Spatial Database System," as a network of independently operated and maintained digital spatial databases. The "Florida Spatial Data Directory" is under development as are priority setting activities for the database.

GEORGIA

Department of Community Affairs
1200 Equitable Building
100 Peachtree Street
Atlanta, GA 30303
Contact: Phil Thiel, Assistant Director
(404) 656-3879

Technology Infrastructure

The Department of Natural Resources (DNR) Environmental Protection Division (EPD) initiated a two phased comprehensive data management pilot project with the U.S. Environmental Protection Agency in early 1985. The purpose of the project was to develop and implement data management systems to better support the environmental management objectives of both the state and the EPA, as well as to provide model concepts, approaches and systems to enhance state/EPA partnerships. The critical management issue was identified as ground water and the implementation of an overall management strategy for it. Specific applications included sanitary landfills, hazardous waste facilities, recharge areas susceptible to non-point source pollution from agricultural chemicals, Superfund, and identification of favorable sites for regional water supply reservoirs. Originally, ARC/INFO software and TIN were used on the EPA's Prime computer. DNR has operated ARC/INFO software on its own Prime since 1989.

Coordination Activities

The Department of Natural Resources acquired Landsat satellite imagery in the mid 1970s and began development of a 1:24,000 scale state base map in the late 1970s. Efforts to develop land information systems at the local level helped encourage state activities as well, including the establishment of the Joint Legislative Land Information Systems Study Committee in 1987. The Committee concluded that "land information has a direct affect on 90% of all local government decisions. . . (and) as such the availability or unavailability of this information has an impact on a wide range of issues such as land conveyances, ad valorem tax administration, property tax inequities, resource allocation and growth management strategies and policies." Citing "an urgent need to initiate a program to correct this problem before it becomes a crisis," the Committee recommended the establishment of the State Land Information and Mapping Advisory Board which was then adopted by the legislature in 1988. The board was selected in January 1989 and includes 21 members consisting of representatives of state agencies, local governments, and some state associations, with staff support provided by the Department of Community Affairs (DCA).

The purpose of the board is to:

- Study land records modernization and how to implement land information systems.
- Provide financial incentives for local governments.
- Encourage cost savings.
- Sponsor public information and educational programs.
- Develop standards and technical specifications for GIS.

The board has been working actively and will recommend appropriate standards for a statewide GIS to the Governor in 1990. There is hope that the recommendations of the board will lead to legislation that will result in a statewide mapping program.

Though unofficially related, in 1987 the legislature adopted omnibus growth management legislation "to provide a framework to facilitate and encourage coordinated, comprehensive state-wide planning and development at the local, regional and state levels of government, and to create the Governor's Development Council." The Commission began work in June 1987 and prepared a Final Report for the Governor in November 1988 entitled "Quality Growth Partnership: The Bridge to Georgia's Future." It recommended that "a coordinated data network be put together with participation by local, regional, state agency and private sector groups to assist those groups in developing demographic, economic, and physical trends and projections."

A Data Needs Work Group was established and, in its "Final Report of the Data Needs Work Group" of July 1989, concluded that a distributed database and information exchange network was needed and "strongly recommend(ed) that all implementation efforts support the ultimate development of GIS at the state, regional and local levels." The report provides a conceptual model of a database and a network which would generate, maintain and distribute data. The goal is to develop as open a system as possible, including a distributed database, with DCA serving as the single state agency responsible for coordinating the database and the network to support coordinated planning. "Core data elements" were also recommended by the work group.

Current plans and activities include database inventorying and development of a data dictionary with a data network including ground rules for electronic sharing of data with common data standards, data definitions, file formats, geographic references and map standards. Funds were allocated for the growth management program and they are being used to develop the GIS for the state. The Department of Community Affairs provides staff support for both activities.

HAWAII

Office of State Planning
State Capitol, Room 420
Honolulu, HI 96813
Contact: Craig Tasaka
(808) 548-3047

Technology Infrastructure

The state is actively developing a statewide GIS which is located in the Electronic Data Processing Division (DPD) of the Department of Budget and Finance. DPD purchased ARC/INFO software in 1988 based on the recommendation of the state GIS Task Force. The Department of Planning and Economic Development (DPED) Coastal Zone Management Program was previously purchasing ARC/INFO software for the Ocean and Coastal Information Management System. When the relevant agencies, including the Governor's Office, became involved, it was determined that a statewide solution was needed. While the system is centrally located, it is envisioned that agencies will have access from their own terminals in the future.

Coordination Activities

Statewide coordination was directed almost from the beginning of Hawaii's experience with GIS. A legislative resolution adopted in 1988 established a GIS Task Force. Responsibility was placed with the then Department of Planning and Economic Development, but the roles of this department were split by the legislature during the 1988 session. In 1988 then, GIS coordination became the responsibility of the new Office of State Planning (OSP) that was established in the Governor's Office.

The GIS Task Force consists of state agency representatives serving on an Executive Committee or Working Committee. The legislature directed the Task Force to assess conditions, develop a plan, and report back to the legislature in 1988. The Task Force recommended a statewide system to meet policy, management, and operational needs in coordination with federal, state, county and private needs. The Coastal Zone Management Program had received some funds from the legislature to do a GIS, so this was combined with the statewide GIS effort. It was recommended that the Electronic Data Processing Division of the Department of Budget and Finance house the

GIS. The Electronic Data Processing Division agreed to buy the hardware, and the Coastal Zone program bought the software, and the Office of State Planning was made responsible for coordinating activities.

During 1989 it was recommended that a needs assessment be conducted, as well as a thorough design and plan for staffing and training. The state is currently in a developmental phase. The next step is to refine the database design document and then refine the state strategic plan.

In addition to the Task Force, a State Mapping Advisory Committee (SMAC) also was created by legislation and meets once per year. The SMAC strictly acts as a liaison with federal agencies. Hawaii also has a Board of Geographic Names. There is no official relationship between these groups at this time, however OSP is the secretary or coordinator for all of them.

IDAHO

Department of Lands
801 South Capitol Boulevard
Boise, ID 83702
Contact: Ray Miller, Chairman
Idaho Geographic Information Advisory Committee
(208) 334-3816

Department of Water Resources
450 West State Street
Boise, ID 83720
Contact: Hal Anderson, GIS Manager
(208) 327-7888

Technology Infrastructure

Idaho has been working with GIS since the early 1980s. The Department of Water Resources (DWR) began using ARC/INFO software in 1986, and now uses it and PC ARC/INFO software on two Micro VAX 3200 computers and four 386 machines, linked by Ethernet. Remote sensing work also occurs in this office. The DWR GIS has been designated by Executive Order to be the lead state agency for GIS facilities and remote sensing. As such the GIS is in operation for the needs of the department, but also functions as a service bureau to provide technical services to other agencies.

Coordination Activities

Idaho's geographic information coordination activities have been led by an active State Mapping Advisory Committee (SMAC) since its creation by Executive Order in 1979. In 1988, an Executive Order renamed SMAC as the Idaho Geographic Information Advisory Committee (GIAC). GIAC's focus is comprehensive and includes interests of the state, federal resource agencies, local government and private organizations which pertain to the "growing resources management problems in the state." GIAC also includes "various geographic information activities - such as remote sensing, digital cartography, and GIS." Voting members in GIAC are state agencies, including Lands, Transportation, Water Resources, Financial Management, Fish and Game, Parks and Recreation, and most recently invited to participate were the State Tax Commission and the Department of Health and Welfare. Ex-officio members of GIAC include federal agencies operating in the state, industry associations, and key academic institutions in the state with GIS expertise. The GIAC meets officially only annually, but it also has a GIS Subcommittee. This group meets almost monthly and its membership includes almost everyone in the GIAC.

The Governor sent a memo to each agency director explaining the GIAC Executive Order, and that the GIAC will be "one of the key groups" to help develop "an information management strategy and to work with other groups to approve standards for interchange of electronic data." The Governor noted that "GIS have the potential to significantly increase efficiency and reduce costs to the state for conducting land, water, demographic, and other resource management activities." He also mentioned the policy statement and data standard developed by the GIAC.

A "Policy Statement for GIS" was developed by the GIAC and signed by the director of each member agency in April 1988 in accordance with the role stated in the Executive Order. The statement includes objectives, policies, and management and organizational responsibilities. A GIS Subcommittee is directed to have quarterly meetings for information exchange, work status review, identify opportunities for exchange of data, joint production of data or the contracting of work between state agencies, and review needs for GIS and determine data categories necessary for statewide applications. It is also responsible for establishing and maintaining an inventory of each category's collection status. "Recommended Standards for Digital Cartographic Data" were developed by the then SMAC on January 29, 1988 and were also approved by the Information Management Policy Board and the Information Management Council.

ILLINOIS

Office of Research and Planning
Department of Energy and Natural Resources
325 West Adams St
Springfield, IL 62704
Contact: Tim Johnson, GIS Manager
(217) 785-8578

Natural History Survey
Department of Energy and Natural Resources
607 E. Peabody Drive
Champaign, IL 61820
Contact: Warren Brigham, GIS Manager
(217) 333-8907

Northern Illinois University
Department of Geography
Laboratory for Cartography and Spatial Analysis
Dekalb, IL 60115
Contact: Rick Dahlberg, Chairman, IMAC
(815) 753-6827

Technology Infrastructure

The Department of Energy and Natural Resources (ENR) manages the Illinois Geographic Information System (IGIS) which was initiated in 1982. IGIS runs ARC/INFO, ERDAS, ELAS, and GRID software on Prime computer equipment which includes a 9955, 750, 2755 and a remotely located 9650 that serves the Hazardous Waste Research and Information Center. The Office of Research and Planning, which is managed by Tim Johnson, is also using SUN workstations. Other ENR divisions that are networked to the IGIS are the State Museum, the State Water Survey, the State Geological Survey, the Office of Administration, and the Natural History Survey which is the center of the GIS activity and the hub of the GIS facility is physically located. Warren Brigham is manager at the Natural History Survey. The Department of Mines and Minerals and the Department of Conservation are also networked with ENR's system.

IGIS is currently one of the largest state GIS systems in the country in terms of technology, data, financial expenditures and staff. The GIS was initially developed to meet the needs of the Office of Surface Mining Lands Unsuitable for Mining Program (LUMP). It is used to determine site suitability for coal mining and helps evaluate mining permits. IGIS contains natural and cultural resources about the state mainly at a small scale, except for some specific sites. The GIS has also helped in a variety of the state's siting projects. A growing thrust of the IGIS is to develop a database that can be used to assess the relationship between economic development and environmental protection that could be used as a resource tool for developing proactive state policy options designed to reduce conflicts.

Coordination Activities

There is no broad statewide GIS coordination effort in Illinois. However, all seven divisions within ENR are connected to the GIS network, as well as two current departments and other planned state departments. Thus, what began as a GIS to meet specific program needs has evolved into a department-wide GIS that includes other users. The users within ENR are considered "IGIS Members." A "Prime Policy Committee" has existed since 1984, and was renamed in 1989 as the "IGIS Policy Committee." This Committee includes a designee from each of the directors of the seven divisions as was directed by the Director of ENR in February 1990. The focus of the Committee is on policy issues and activities related to the IGIS including overseeing the operation and development of the IGIS. "Management Policies for the IGIS" were approved in September 1989.

In addition, the Illinois Mapping Advisory Committee exists to make recommendations to federal agencies about mapping activities. The Committee is quite active, and ENR and other agency representatives attend these meetings. They have a Subcommittee on standards. The Illinois Geologic Mapping Advisory Committee is the first in the nation to set priorities for geological mapping. It was organized in response to a need for more geologic mapping and a possible new national program to help fund and accomplish it. The Committee is also working on possible standards.

INDIANA

Data Processing Oversight Commission
309 W. Washington Street, Suite 301
Indianapolis, IN 46204
Contact: Kathy McCarter, Systems Analyst
(317) 232-4995

Technology Infrastructure

Indiana state agencies have recently begun accelerated GIS activities. The Department of Natural Resources (DNR) runs ARC/INFO software on a Prime 2755 computer that began being installed in 1989. It was partially funded by the Water Resources Division of the U.S. Geological Survey. DNR is concentrating its GIS activities on wetlands using data originally created by the U.S. Fish and Wildlife Service.

Coordination Activities

Indiana recently began an aggressive effort to coordinate statewide GIS and GIS-related activities. The Data Processing Oversight Commission (DPOC) and the Department of Administration (DOA) assumed a lead role to develop a "comprehensive approach to state GIS." Their focus included that "consistency and partnership must be promoted across state agencies, with local governments and federal entities, in the collection, coding, and use of geographic data, and in the modernization of land records. Long range strategic planning is provided in the logical coordinated acquisition of GIS technology by or for state government."

The GIS Advisory Resource Group was organized in September 1989 by DPOC and DOA to help determine adequate standards, state direction and an organizational framework for a cooperative statewide GIS initiative. The goal was to include local and federal agencies in the review process about policies and standards. The GIS Advisory Resource Group consists of representatives of eight state agencies, the Indiana Association of Cities and Towns, the Association of Indiana Counties, the Indiana Association of County Commissioners, federal agencies (represented collectively by the U.S.D.A. Soil Conservation Service), and the University GIS Alliance.

The Indiana GIS Forum was organized in August 1989 and serves as a state users group. It was organized to educate state agency personnel on GIS issues, discuss GIS related topics, and review new developments in GIS technology. The Forum meets monthly and produces a newsletter. The current objectives of the Forum are to identify state, federal, and local agencies requirements for GIS, assist in the development of standards for acquisition, implementation, utilization and maintenance of the technology, provide visibility of current applications, identify resources and data sharing required for GIS implementation and operations, and attempt to initiate methods to reduce the costs of the technology.

The University GIS Alliance was formed in January 1989 "to establish a cooperative procedure for the state funded and private colleges and universities to assist governments, businesses and industries with all aspects of GIS technologies and problem solving." State government representatives suggested the Alliance be formed when representatives of different universities began talking with the state and expressed desire to be involved in the state's activities. Members include faculty of Ball State University, Indiana State University, the University of Indiana and Purdue University. DPOC asked the Alliance to serve as a technical resource group for the GIS Advisory Resource Group.

All of these groups work together. The GIS Advisory Resource Group and the Alliance participated in the development of proposed standards. The Forum and Alliance meet together on a monthly basis. The first statewide meeting was held on February 6, 1990 and was sponsored by the Alliance in cooperation with the Forum. An initial Indiana GIS needs assessment and user requirements analysis was conducted in 1989. Presently, the data architecture and standards are under review and revision. They include proposed "controls on acquisition of GIS-related hardware, software, and digital data," including quality controls. The draft data architecture and standards were developed jointly by the Advisory Group and the Alliance. There is a proposal for more committees to establish a policy focus.

IOWA

Department of Natural Resources
Wallace State Office Building
East 9th and Grand Avenue
Des Moines, IA 50319-0034
Contact: Kevin Kane, GIS Coordinator
(515) 281-5815

Technology Infrastructure

The Department of Natural Resources (DNR) is in the process of developing the Natural Resources Geographic Information System (NRGIS). Within the DNR, the Geological Survey Bureau is the leading agency in GIS development. According to a DNR-wide plan, the Department runs PC

ARC/INFO software on 6 workstations, and runs EPPL-7 on 20 workstations. The original project goal to address ground water, as required by the legislation authorizing the NRGIS, is anticipated to be completed in 1992.

Coordination Activities

Statewide GIS coordination began recently in Iowa. The Geographic Information Task Unit was formed within the DNR in 1987 to develop a department-wide plan for establishing the NRGIS. This Task Unit was made up of representatives of seven divisions of the DNR in response to the Iowa Groundwater Protection Act of 1987, that had proposed the establishment of NRGIS. In March 1988 the Unit developed a plan entitled "A Preliminary Plan for Implementation of a GIS." After additional work, the GIS plan was adopted by the DNR leadership. A GIS Coordinator position was established in the Coordination and Information Division of the Planning Branch.

An unnamed informal statewide Iowa GIS group has existed since July 1989. The group includes state agencies, universities, local governments, federal agencies, and private companies. The first large meeting was held in December 1989, and interest is strong. The primary goal of the group is networking and information exchange. It has drafted an executive order to create a GIS Council with the purpose of bonding state agencies. One of the major needs is dedicated funding. The group plans to take the results of current projects to show to upper level people in each agency. It is envisioned that the role of the Council would be to establish standards and "coordinate policies, planning and direction of state GIS and determine agency responsibilities for managing and operating coordinated systems, ... and guidelines as to data ownership and the degree to which that data can and will be shared between agencies."

KANSAS

Department of Administration
Division of Information Systems and Communication
900 SW Jackson, Room 751
Topeka, KS 66612-1275
Contact: Jim Parker
(913) 296-4394

Technology Infrastructure

A number of GIS activities are under development in Kansas. To date, the majority of GIS activities have occurred at the University of Kansas where the Kansas Geological Survey and the Kansas Applied Remote Sensing (KARS) Program are located. The largest GIS system is at the Kansas Geological Survey which uses ARC/INFO software on Data General equipment. The KARS Program, which has been in existence since 1972, uses PC ARC/INFO and ERDAS, among other software. Both offices have been active in providing services and assistance to various state and local government entities. The Kansas Cartographic Data Base (KCDB) is maintained by the Kansas Geological Survey.

Coordination Activities

Statewide coordination of GIS development has been underway in some form or another for over a decade with recent efforts linked with the Department of Administration's Division of Information Systems and Communications (DISC). The Kansas Commission on Applied Remote Sensing was established by statute in April 1984 to direct the Kansas Applied Remote Sensing (KARS) program located at the University of Kansas Space Technology Center. The Program was originally established in 1972, and it served with the Commission and various state agency representatives to assist users in assessing the capabilities, costs and alternatives for employing remote sensing and GIS technologies as well as a forum for interagency communication, coordination and cooperation. Many projects to build data and support these goals have been undertaken since KARS began.

In 1983, an interim legislative committee recommended that state agencies get together to develop a plan to share water data. The Kansas Water Data Committee was formed in 1983. Members included water agencies, DISC, the U.S. Geological Survey and the Soil Conservation Service. In 1984 the committee recommended that a "Kansas Water Data Base" be established and, since then committee efforts have concentrated on GIS needs. Based on these activities, and on the interests and requests of other agencies, DISC initiated a GIS Steering Committee in August of 1987. The purpose was to develop standards, a plan, and other specifications for statewide development of GIS as well as to provide some services to "applicable customers." The committee included representatives of state agencies and the Kansas Association of Counties and the League of Kansas Municipalities. Collaborative work resulted in the Water Data Committee production of a report in September 1988 entitled the "Kansas GIS Initiative." This report reviewed needs of various agencies based on a survey and included a Fiscal Year 1990 budget request.

Based on the recommendations of the GIS Steering Committee, the Governor sent a memo to all agency directors on March 14, 1989. It described the intent to "establish a Kansas GIS Initiative" and the fact that the director of the Water Office was asked to serve as Chair of a new GIS Policy Board. The Committee was appointed in August 1989 and includes representatives of state agencies and legislative staff. The role of the Committee is to address policy issues related to GIS development and management including data access, database priorities, standards, funding and interagency coordination.

A GIS Technical Advisory Committee was formed by the GIS Policy Board to address technical issues related to GIS development and implementation and to provide input to the GIS Policy Board. Representatives on the GIS Policy Board were appointed by GIS Policy Board members to represent their respective agencies. Three subcommittees were established to deal with planning, geographic data standards and database development. Staff support for both groups is provided by DISC and the Water Office. Priorities of the GIS Initiative include a GIS inventory/directory, data exchange standards, a five year plan, and database implementation.

KENTUCKY

Natural Resources Environmental Protection Cabinet
14th Floor, Capitol Plaza Tower
Frankfort, KY 40601
Contact: Belinda Holland, Information Resources Manager
(502) 564-5174

Technology Infrastructure

The Kentucky Natural Resources Environmental Protection Cabinet has a cabinet-wide GIS. It is located in the Data Management Branch of the Cabinet and is called the Kentucky Natural Resources Information System (KNRIS). The KNRIS uses ARC/INFO, ELAS, TIN, NETWORK, and Minitab software on a Prime 9955 computer. The KNRIS began being developed in 1979 with funds provided by the Office of Surface Mining and became operational in 1981. KNRIS is currently used in the Cabinet Secretary's Office, the Department of Natural Resources's Division of Conservation and in the Department for Surface Mining Reclamation and Enforcement.

Coordination Activities

Statewide focus and coordination began in earnest in 1988. The Kentucky Information Systems Commission (KISC) requested that the Department of Information Services (DIS) assess the feasibility of implementing a statewide GIS for the state and local governments in the

Commonwealth. The 30 member GIS Task Force is made up of Cabinet-appointed voting representatives from the departments of Natural Resources, Revenue, Energy, Mines and Minerals, and the Legislative Research Commission and non-voting representatives from the planning commissions, utilities and others. The first meeting was held in December 1988 and three subcommittees were formed entitled Requirements, Technical and Implementation; the Task Force then began to pursue GIS feasibility and requirements.

A survey was conducted early in 1989 and a two day work session was held to develop an overview document to develop a strategy for developing a statewide GIS and for developing a framework for GIS-related budget requests for the 1991-92 biennium. The resulting document, the "Statewide Task Force on GIS - Overview: Organization and Activities," was completed in September 1989. This report provides a review of activities in the state based on the GIS Survey and recommendations of the state task force. The Task Force recommendations were to:

- Develop a shared GIS across the Kentucky Statewide Network.
- Establish a structure for the coordination of GIS activities, including a coordinator, and support group. The role of the coordinator would be to maintain a central data dictionary, develop applications, and produce projects for those without systems. The KISC would serve as the steering committee to make decisions and milestones based on the recommendations of the GIS Task Force who would serve as the GIS Advisory Council for KISC.
- Perform a GIS requirements analysis.

It was informally agreed that the Natural Resources Cabinet would serve in a lead role for the state.

LOUISIANA

Water Resources Information Center (LAWRIC)
Department of Transportation and Development
P.O. Box 94245
Baton Rouge, LA 70804-9245
Contact: Sharon Balfour, Manager
(504) 379-1478

Technology Infrastructure

The Department of Transportation and Development (DOTD) has the state's largest current activity in GIS related technology. DOTD has a department-wide system that uses Intergraph software on 14 workstations. A two year research study began in July 1989 with the Federal Highway Administration entitled "Spatial Information and Modeling System for Transportation" (SIMST). Data collected via global positioning system (GPS) technology, satellite imagery, aerial photography, and federal digital databases and maps will be assessed for DOTD needs. Demonstrations will be used to test the use of these sources for highway needs, pavement management, and storm discharge applications. Other agencies are investigating and planning to develop GIS capabilities.

Coordination Activities

Statewide GIS coordination activities began in late 1988. Within the DOTC is the Louisiana Water Resources Information Center (LAWRIC) which was created by the legislature in 1983 "to implement an indexing and data accessing system" for all water and water-related resource data collected by federal, state and local agencies. LAWRIC is an indexing and referral service which publishes a directory including information about water data sets and projects.

A GIS Task Force was created in early 1989 after LAWRIC sponsored a meeting of state agency representatives to discuss the needs for a State Geographic Information Center on December 13,

1988. The Task Force currently exists on an ad hoc basis and was initially intentionally limited in focus to state agencies only. The goal has been to bring all three branches of state government into the effort. Three subcommittees were originally established to inventory data sets and GIS capabilities, determine immediate functional needs of state agencies, and define the goals of a state Geographic Information Center. Subcommittees that will begin work in 1990 include organizational arrangements, standards and guidelines, benefits, inventory, applications, and providers and users. The Task Force prepared a Memorandum of Understanding (MOU) to develop an "efficient and effective method for the coordination, research and development, access to, and technical assistance of geographically related information within state government." The MOU was signed by the Secretary or top executive of each of many state agencies, including the legislative and judicial branches, in December, 1989.

The Task Force also developed and adopted a GIS Strategic Plan during the fall of 1989. The goals of the plan are to "establish an efficient and effective method for the coordination, research and development, access to and technical assistance of Geographically Related Information (GRI) within State Government (and to) educate State Government in the use and benefits of GIS." These objectives include the development of a position paper describing the justification, feasibility and recommended "levels of implementation of a GIS plan to be presented for approval to the Department Heads or equivalent, and if appropriate, for the Department Heads to go forward to the Governor and/or Legislature." Sharon Balfour is the Task Force chair.

MAINE

Office of Information Services
Department of Administration
State House Station #195
Augusta, ME 04333
Contact: Valton Wood
(207) 582-8882

Technology Infrastructure

Maine recently began department-wide GIS implementation, although efforts to do so have been underway since 1985, and some GIS activity was occurring a decade ago. The Department of Conservation runs ARC/INFO software on SUN workstations that were installed in January 1990. Legislation was adopted in 1987 to provide for this GIS which included a one time appropriation and two staff positions. GIS pilot projects are just beginning in 1990 for groundwater and low level radiation research.

Coordination Activities

While the Department of Conservation was developing its GIS plans, the Department of Economic and Community Development realized that GIS could be useful in helping towns develop their comprehensive plans as part of the legislative effort to manage growth in the state. Based on this need, an Executive Order was signed by the Governor in May 1989 to form a GIS Steering Committee to oversee the development of a strategic plan regarding GIS in the state as a whole. The Committee's Charter provided that its role would also include:

- Setting priorities and allocating scarce governmental resources;
- Setting policy that relates to GIS and affects all users/providers;
- Arbitrating differences between using organizations;
- Assuring compatibility of information systems;
- Presenting periodic progress reports to the Governor's Office, the Information Systems Policy Committee (ISPB) and the Legislature.

The Committee has worked as a task force to develop the strategic plan. Designated by the Governor, the members include Commissioners of state agencies (or their designees), two members of the Legislature, as well as leaders of the U.S. Geological Survey, University of Maine, Central Maine Power Company, and Portland Council of Governments. The Committee was staffed by the Office of Information Services (OIS).

"Toward a Statewide GIS: A Strategic Plan," was completed in February 1990 and submitted to the Governor. In its vision statement, the Steering Committee saw a "statewide GIS as a tool that would enhance the quality of life in Maine by proactively providing the geographic information needed to improve the delivery of government products and services." The plan ranked applications as mandatory, necessary, and operational within a proposed seven year implementation time frame. A GIS Council was proposed. The Council would have broad authority to review requests, hire staff, solicit funds and conduct rule making. The existing State Mapping Advisory Committee (SMAC) would be a another element of the Council.

MARYLAND

Office of Planning
301 W. Preston Street
Baltimore, MD 21201
Thomas Nasuta, GIS Manager
(301) 225-4450

Technology Infrastructure

The University of Maryland at College Park's Computer Science Center acquired ARC/INFO software in 1989 which they operate on an IBM 3091GX mainframe. This is the largest GIS in the state. The facility is available to any public organization in the state and facilitates file sharing and data standards at a central location. Several departments at the university use the system. The Geography Department is probably the largest as it provides training, consultation, project work and related GIS services on a contractual basis to several state and local agencies, including the Office of Planning, the Department of Natural Resources (DNR) and others, for statewide development plans and land and water resources analyses.

Coordination Activities

The Office of Planning houses the Planning Data Services Division which has served as an organizational home for statewide GIS activities since 1974. The Maryland Automated Geographic Information (MAGI) System was developed with U.S. Department of Housing and Urban Development funding to work on the state's comprehensive land use plan. MAGI is used through ERDAS software on personal computers at the Office of Planning. The Office of Planning also uses MIPS and ARC/INFO software through the University. The Office of Planning GIS data is physically located at the University with terminal access at the Office of Planning.

With a recognized need for improved coordination among state agencies, a series of meetings began in 1988 attended by representatives of state agencies including DNR, Agriculture, Environment, Assessments and Taxation, Transportation and State Planning, the University of Maryland and Salisbury State University. These meetings led to an inventory of GIS activities that were underway and proposed throughout the state. Various issues, including the need for a statewide focus and framework to network activities, were discussed. More recently, a number of higher level representatives of the DNR, the Department of Assessments and Taxation, and the Office of Planning met during mid 1989 to focus on issues of common needs, issues, and standardization relating to GIS. A presentation was given for the Governor and other members of the cabinet which focused on the considerable effort and investment that is occurring in GIS and the need for a cooperative effort at the state level.

MASSACHUSETTS

Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202
Contact: Richard Taupier, Assistant Secretary
(617) 727-9800

Technology Infrastructure

The Executive Office of Environmental Affairs (EOEA) manages the Cabinet-wide Massachusetts Geographic Information System, "MassGIS." MassGIS began in 1986 at the Water Resources Division (WRD) of the U.S. Geological Survey office in Boston. Two EOEA agencies previously had cooperative projects with WRD, including the Hazardous Waste Facility Site Safety Council, which were followed by a watershed management study. In June 1989, EOEA purchased its own version of ARC/INFO software to operate on a VAX 6330 computer located at the EOEA Data Center. Oracle software is used to manage most of the attribute data. Three Tektronix terminals and two 386 personal computers run Grafpoint's T-NET emulation software through a Banyon LAN. EOEA also has copies of PC ARC/INFO software which are used by various parts of EOEA.

Coordination Activities

An informal statewide GIS coordination activity is underway. In 1988 the Senate Special Committee on Long Range Policy Planning identified GIS as a strategic tool for planning at the state, regional and local levels. The Committee report made it clear that interagency cooperation in the production and analysis of geographic data is a regulatory, economic and scientific necessity. Responding to this initiative, a number of agencies organized a Massachusetts Geographic Information Committee (MAGIC) in late 1988 to:

- provide a forum for the sharing of knowledge about programs and databases;
- to avoid the expense of creating redundant databases;
- to determine methods and protocols for distributing digital data to all levels of government;
- to save money on information technology and coordinate purchases;
- to speak with one voice to the federal government about mapping projects that impact the state.

As designed, MAGIC membership is open to all, but an Executive Committee, elected by the membership, is composed of representatives of six state agencies, four municipalities, two state authorities, three RPAs or counties, two academicians, two people from the legislature, and three people from the private sector. The focus and proposed working committees include digital mapping, parcel mapping, aerial photography, data standards, and data distribution. A formal statewide effort or directive for MAGIC does not exist, however the Executive Office of Environmental Affairs (EOEA) is the unofficial lead of the state effort.

MICHIGAN

Land and Water Management
Department of Natural Resources
P.O. Box 30028
Lansing, MI 48909
Contact: Michael Scieszka, Resource Specialist
(517) 373-1170

Technology Infrastructure

The Michigan Resource Inventory Program (MRIP), located in the Land and Water Resources Division of the Department of Natural Resources, was created through the 1979 Michigan Resource Inventory Act. The intent of the Act was to gather the best available information about the state land and water resources and place that information in a format that provided maximum access. The Act required the development of a resource inventory containing detailed land cover/land use information and overlays which display land resource data.

The MRIP uses Intergraph IGDS/DMRS and Graphics Polygon Processor Utilities (GPPU). The MRIP houses six graphics workstations which are linked to the Geological Survey, Public Health, and other users in the DNR, including other parts of the Land and Water Management Division and the Real Estate Division for read only access. ERDAS software is also used. Currently, efforts are underway to broaden the scope within DNR and build databases.

Coordination Activities

In accordance with the 1979 Michigan Resource Inventory Act which created the Michigan Resource Inventory Program (MRIP), the Governor appointed the Inventory Advisory Committee (IAC) in the DNR to advise the legislature, governor and the department. It was directed to be composed of 20 members with the advice and consent of the Senate, including representatives from municipalities, counties, regional planning commissions, soil conservation districts, the major state agencies affected by the inventory, federal agencies, major land resource based industries, environmental groups, and the general public from various areas of the state. It included at least five subcommittees: agriculture, forestry, minerals, unique and special environments, and developed land. It was designed to set policy, priorities, standards and data collection/review methodologies to insure accurate and useful products. During the last few years, this group has not been very active, but serves to advocate the program for natural resources needs.

The MRIP serves as a clearinghouse and inventory of various land and water resource information. The MRIP helps support a users group of entities using C-MAP which is a system used by small entities throughout the state. In addition, the Michigan Land Information Exchange (MLINK) is a grass roots effort of representatives from public utilities, state, regional and local governments, surveyors, appraisers and others. It is being formalized at this time.

MINNESOTA

State Planning Agency
Minnesota Land Management Information Center (LMIC)
Room 300, 658 Cedar Street
St Paul, MN 55155
Contact: Alan Robinette, Director
(612) 296-4394

Technology Infrastructure

Minnesota's Land Management Information System (MLMIS) began in the early 1960s in response to rapid development of lake shores. Initiated in 1967 at the University of Minnesota, the Land Management Information Center (LMIC) was one of the first state GIS facilities in the country. Between 1967 and 1977 the state invested $2 million in the development of a statewide geographic database and the capability to analyze the data for state resource management programs. In 1977 the system was transferred to the Minnesota State Planning Agency and the focus changed from that of a research center to that of a service bureau. LMIC now serves as a GIS service center, providing services to various state and, more recently, local and regional agencies.

The Land Management Information Center has a Prime 9955 II computer on which it uses the Environmental Planning Programming Language (EPPL-7). The University developed EPPL-7 for in-house analysis, modeling and display of data with the also university-developed 40 acre grid cell mapping system. The Land Management Information Center purchased ARC/INFO software in 1983, and they also acquired PC ARC/INFO software. LMIC is also in the business of marketing EPPL-7.

Coordination Activities

The Land Management Information Center has no directive regarding statewide GIS coordination although it has served in this capacity in a de facto manner. During the early 1980s, LMIC had more resources to develop statewide databases of general use to many users, but, most recently, it has had to rely more on project-specific jobs especially because other state agencies are acquiring their own GIS capabilities. LMIC has no authority to set standards for accuracy or quality of the raw data provided by users, but it does serve as a data clearinghouse and offers comprehensive information services and some consulting to users. Though lack of directive is evident, some statewide needs have been met by default and the efforts of the staff. LMIC's recommendation for its future is that it add the function of a state clearinghouse to its mission. It also could become a GIS laboratory.

With a purpose of improving interagency coordination and accelerating progress toward statewide geographic data integration, the Intertechnologies Group of the Department of Administration granted $25,000 to the Natural Resource GIS Consortium (NRGIS) through LMIC. During the first half of 1989, NRGIS used the funding to support the Minnesota Geographic Data Integration Project to organize the Consortium into functional and technical committees, to inventory databases, and to recommend methods for exchange of data, maintenance and updating of data, and standards for data interchange and data classification, as well as to report on the status and direction of geographic data integration. The group's name was changed to the GIS Consortium to reflect its broader mission. Pilot projects included one on data exchange and one on GIS standards. Efforts were also made on data development priorities, and methods to improve the implementation of GIS technology.

One of the results of the project was a series of reports completed in August 1989. The series of reports included an Annual Report; an Inventory of Digital Data Collections; Recommended GIS Standards, Guidelines, and Procedures: Building a Minnesota GIS Map Library; and the report on the Data Exchange Research Project. This last report reviewed the project. The review included documenting and evaluating these data exchange translators: ARCDXF and DXFARC as part of

ARC/INFO software; AutoCAD software's DXFIN and DXFOUT; ARCACAD and ACADARC provided by ConRim Systems, Inc.; and DXFIN and DXFOUT developed for Intergraph by Bently Systems, Inc.. In addition, translation, system and procedural problems were identified as well as questions for further research.

The 1989 legislature directed that a study be conducted of Minnesota Land Resource Information Systems (LRIS). The study was directed to examine interagency cooperation, public and private venture potential, the status of GIS planning as it applies to Minnesota, the role that LMIC should play in future development of an overall system, and the development of a long-range strategy for Minnesota's role in providing appropriate services to agencies and political subdivisions. At the same time, the legislature directed that a study be conducted of related information systems in the Department of Natural Resources. Both studies are now underway.

MISSISSIPPI

Institutions of Higher Learning
Mississippi Automated Resource Information System (MARIS)
3825 Ridgewood Road
Jackson, MS 39211
Contact: Paul Davis, Director, MARIS
601/932-6354

Technology Infrastructure

The Mississippi Automated Resource Information System (MARIS) is a statewide GIS located in the Mississippi Institutions of Higher Learning. Beginning in the early 1970s, the concept of a statewide resource information system grew out of state planning efforts conducted by the Mississippi Research and Development Center (MRDC) under the U.S. Department of Housing and Urban Development's 701 Comprehensive Planning Assistance Program. The purpose of MARIS was to provide a more effective method for managing the state's data and to provide products for database users. MARIS was formally established by executive order in July 1983 and was reconfirmed by the next governor in 1986. Legislation adopted in 1986 resulted in formal recognition of MARIS's role in state government as "the mechanism for the storing, processing, extracting, and disseminating of useful data and information relating to the state's natural and cultural resources."

ERDAS software was installed on a DEC PDP 11-24 computer in 1983. In 1989, efforts began to transfer activities from ERDAS to ARC/INFO software. MARIS will use both ARC/INFO software and ERDAS's image processing systems on a VAX 6310 computer. Some agencies, including the Department of Natural Resources (DNR), have remote access to the system.

Coordination Activities

MARIS serves multiple roles in the state, coordinating natural and cultural information resource activities in the state, and operating the state GIS. Administrative and technical services are provided by "MARIS Central", a hub from which users can obtain or develop data, have it analyzed, and be directed to sources of existing data. Technical services are provided on a fee-for-service basis with focus on natural and cultural resource-related information. MARIS is directed by a consortium of over 20 state agencies with direction and assistance from three interrelated groups which are all described in the legislation which established MARIS in 1986.

The MARIS Policy Committee is composed of the directors of the agencies that are members of MARIS. Members include state agencies and academic centers, including Archives and History. The responsibility of the Committee is to oversee the role of MARIS within Mississippi state government by:

- Providing support and guidance to the resource needs of the MARIS Task Force.
- Developing policy strategy and support that is required to implement the plans and recommendations produced by the Task Force.
- Providing the Task Force with specific objectives for development of plans and strategies, when necessary.
- Committing to the overall mission and growth of MARIS.

The MARIS Task Force consists of two or more technical or management staff members from each member agency. The Task Force meets monthly. The primary objectives of the Task Force are:

- To be the principal coordinating body within state government to identify common natural, cultural, and socioeconomic resource needs among state agencies.
- To coordinate the internal development of special purpose committees and other planning functions required to meet the resource/database needs identified as most important and most useful to state government as a whole.
- To channel committee-developed plans and recommendations to the MARIS Policy Committee, or other appropriate program officials who influence legislation, funding, or other methods of implementation.
- To serve as a liaison between the technical service capabilities of MARIS and the needs of their own agency.
- To stay informed about the information holdings, activities, and missions of other state agencies; and to keep abreast of the technical services and database development within MARIS.

The MARIS Executive Committee serves to coordinate the planning, policy and technical activities of the Policy Committee and the Task Force. The Executive Committee has five members: three elected from and by the Policy Committee, and two advisory members.

A State Mapping Advisory Committee was rejuvenated in 1989, but it will only concentrate on A-16 review for federal mapping input.

MISSOURI

Department of Natural Resources
P.O. Box 176
Jefferson City, MO 65102
Contact: John Finley, GIS Administrator
(314) 751-2963

Technology Infrastructure

The Division of Geology and Land Survey (DGLS) of the Department of Natural Resources (DNR) initiated a GIS project in 1988 to meet the need for a Public Water Drinking Protection Plan for ground water. DNR is running ARC/INFO software on a Prime 2755 computer, and PC ARC/INFO software. This project is a cooperative effort between the Division of Geology and Land Survey and the Division of Environmental Quality (DEQ). DNR purchased the equipment, and the EPA is contributing funds to the effort. An even more detailed part of the state is being developed in a pilot project in St. Charles County. It will include all information available in DNR to see if GIS can be a tool for geologists and engineers.

Coordination Activities

An Interagency GIS Cooperative was formed in December 1989 that includes technical and management level members from state agencies (the DNR, the Department of Conservation, the

Department of Highways and Transportation, and the Office of Administration, Data Processing and Telecommunications), and federal agencies (the Corp of Engineers, the U.S. Geological Survey National Mapping Division), and the University of Missouri Department of Geography. It basically serves as a statewide users group and has no authority. The DNR serves as a de facto state lead for GIS, and its representative in the Cooperative, John Finley, serves as the chair.

The state also has a State Mapping Advisory Committee (SMAC) that provides input on federal mapping requirements.

MONTANA

Montana State Library
Natural Resource Info System
1515 East 6th Avenue
Helena, MT 59620
Contact: John Sesso, Director, NRIS
(406) 444-5355

Technology Infrastructure

The Montana State Library manages and operates the Natural Resource Information System (NRIS). The NRIS was created in 1985 to design and implement a comprehensive system for the acquisition, indexing, and retrieval of statewide natural resource information. NRIS includes the GIS project begun in 1987 which is funded principally by the EPA Superfund. The GIS uses ARC/INFO and ERDAS software on a Prime 2755 computer with a Tektronix workstation.

Coordination Activities

While the Montana State Library GIS does not have a statewide mandate, it is serving in a de facto lead agency role for statewide coordination. In addition to GIS, the NRIS has the following programs:

- The Natural Resources Indexing System began in 1985 to index natural resource information and provide a centralized access point for that information for all resource related agencies. It is not a repository, but an index and contact point.
- The Water Information System serves as a repository for some data and an access point for other databases.
- The Montana Natural Heritage Program is a joint venture between the state and the Nature Conservancy which funds it. Established in 1985, the program systematically collects information on Montana's sensitive or threatened plant and animal species.

One of the roles of the NRIS is to promote coordination among "agencies that collect, manage, or use natural resource information to prevent duplication of effort and promote information sharing, provide assistance in systems design and in developing standards for the collection of new data to ensure quality and compatibility, and manage a cost effective clearinghouse and referral service to link users with the best source of information." The coordination effort is being guided and formally established by a memorandum of understanding (MOU) that is being signed by state and federal agencies. The purpose is "to establish a vehicle for participating agencies and organizations to coordinate the development of GIS in Montana." The MOU encourages agencies "to minimize the duplication of digital data, to transfer technology and exchange data, to develop data standards and to share resources in completing joint interagency projects." The MOU has three committees:

- The Steering Committee is composed of management level representatives from all agencies signing the agreement.
- The GIS Interagency Technical Working Group was chartered by the Steering Committee who signs off on any of the work the technical group is doing. The Technical Group provides a vehicle for the execution of joint GIS projects. It has developed data documentation standards, guidelines for data standards, the Montana GIS User Directory and the Montana GIS Data Directory, that are both produced by the NRIS.
- The GIS Users Group is supported by the NRIS program. Its staff maintains a mailing list, publishes a GIS newsletter and sponsors a GIS user conference each fall with participation by state, local, and federal agencies and the private sector.

NEBRASKA

Department of Administrative Services
Central Data Processing
501 14th Street
Lincoln, NE 68509
Contact: Steve Henderson
(402) 471-2065

Technology Infrastructure

GIS activities have existed in some state agencies for a couple of years and have recently begun to occur in others. The largest GIS activity in the state is located at the Center for Advanced Land Management Information Technologies (CALMIT) which was formed in 1986. It is administratively located in the Conservation and Survey Division of the University of Nebraska which is also the State Geologist's Office. CALMIT has a MICROVAX II computer with some workstations, and a wide assortment of software including ARC/INFO, PC ARC/INFO, EPPL-7, SAGIS, MOSS, ERDAS, ELAS, and pMAP. CALMIT has plans to acquire GRASS and SPANS in 1990. CALMIT is conducting a variety of GIS projects including groundwater pollution and soils analysis, and also sponsors educational sessions. In addition, the Nebraska Natural Resources Commission (NRC) runs GRASS, ERDAS, and MIPS software on VAX equipment, and they are planning to acquire ARC/INFO software. The NRC is responsible for long range management and planning of land and water resources in the state, and manages the Natural Resources Data Bank which was created by legislation in 1969.

Coordination Activities

No official directives exist for GIS coordination, however coordination activities are occurring. Legislative Bill 384 of 1969 stated that the Nebraska Soil and Water Conservation Commission (now the Natural Resources Commission) is "authorized to establish, maintain, and administer a data bank in the field of soil and water resources." A technical advisory committee was also established by the legislation. The NRC developed a proposal in late 1989 that a GIS network and committee be established, and a group was informally organized. An ad hoc Nebraska GIS Steering Committee had been formed in July 1988 to "promote cooperation and communication between persons, agencies and organizations having interests in GIS." The Committee has been voluntary and ad hoc, with leadership provided by the Center for Advanced Land Management Information Technologies (CALMIT). At a joint meeting in February, 1990 it was decided that an internal assessment of conditions in the state be conducted, including an inventory and identification of policy issues, needs for standards and other coordination issues. The Department of Administrative Services Central Data Processing unit is serving in a coordination role.

NEVADA

Nevada State Mapping Advisory Committee
Bureau of Mines and Geology
Reno, NV 89557-0088
Contact: Jonathan Price, Chairman
(702) 784-6691

Technology Infrastructure

Nevada has just begun development of GIS capabilities. No state agency is running GIS comprehensively yet, but the Bureau of Mines and Geology (BMG) acquired PC ARC/INFO software in 1989. The GIS will be used to study radon occurrences statewide and combine that information with site geology and occurrence of health problems. It is part of a three year cooperative project with the EPA and the State Health Department.

Coordination Activities

Coordination activities in Nevada have been steered by the State Mapping Advisory Committee (SMAC). State agencies are members and representatives of federal and county agencies also participate. SMAC mainly serves to develop recommendations for A-16 mapping priorities for the U.S. Geological Survey. A GIS Subcommittee was formed in 1989 to consider the formalizing of a statewide structure for a state GIS/Land Records group and effort under the SMAC. The following organizing steps and needs were identified:

- Identify data collection efforts including digital data and photography.
- Identifying GIS technology in the state in both public and private.
- Create and maintain a data and software directory.
- Create quality assurance protocols, including identification for input scale and quality of data.
- Data exchange protocol standards.

Three working groups have been organized:

- Basic Issues will address codes and statutory requirements, benefit/cost ratios, data responsibilities, maintenance, security, and property records.
- Information Issues will address classification and data standards, interagency and intergovernmental data processes, geographic reference standards, emerging technologies and data security.
- Management Issues will address financing and capitalization of data systems, institutional arrangements, cooperative agreements, and training.

It is anticipated that some type of clearinghouse function will be needed.

NEW HAMPSHIRE

Office of State Planning
2 1/2 Beacon St.
Concord, NH 03301
Contact: David G. Scott
(603) 271-215

Technology Infrastructure

New Hampshire has been working with GIS for over five years, most recently as part of a statewide initiative to promote orderly development in the state. The Office of State Planning (OSP) is responsible for monitoring growth and development as well as assisting state and local government in the area of land use planning. In 1984, OSP established a cooperative GIS project with the University of New Hampshire to apply computer mapping to land use planning and resource management problems. In 1985, the legislature directed OSP to help the Governor prepare a statewide development plan to provide for orderly economic development of the state. The statewide development plan required goals, policies and a database of technical information to support the policy formulation process. The Office of State Planning and the University responded to the legislative directive by developing the GIS, called the GRANIT system (Geographically Referenced Analysis and Information Transfer), and coordinating activity with other state and federal agencies. The University of New Hampshire runs ARC/INFO software on a Prime 6550 computer which is located at the University Complex Systems Research Center (CSRC). The Office of State Planning runs PC ARC/INFO software as does CSRC. GIS applications and database development are carried out by CSRC under an annual funding agreement with OSP.

Coordination Activities

OSP leadership has given the state strong GIS coordination from the beginning. In addition, the Council on Resources and Development (CORD) has served as an interagency group of lead agency officials to consult on common problems in environmental protection, natural resources and growth management, resolve differences, and recommend appropriate courses of action to the Governor. CORD established a GIS Advisory Committee in April 1987 to coordinate GIS activities and recommend database strategies, standards and related measures to CORD for endorsement and implementation. Committee members include federal, state agencies, and regional planning agencies. Policies agreed on by the Committee include:

- To coordinate state, federal and regional agency efforts in the construction and updating of elements contained in the statewide GIS data base.
- To encourage multi-disciplinary and interagency cooperation on projects involving the application of GIS techniques.
- To develop procedures which allow access to and distribution of information contained in the NH GIS database for the benefit of state and local government decision makers.

NEW JERSEY

Department of Environmental Protection
Division of Science and Research
401 East State Street, Cn 409
Trenton, NJ 08625
Contact: Pat Cummens, GIS Manager
(609) 633-0783

Technology Infrastructure

The Department of Environmental Protection (DEP) is a full function natural resources and environmental protection agency with 4000 employees. Efforts toward building a GIS began with a needs assessment conducted in 1986. In February 1987, the DEP set up GIS in the Geographic and Statistical Analysis Unit (GSAU) of their Division of Science and Research. The system is on a dedicated Prime 9955 computer using ARC/INFO software, and has numerous graphics terminals and links to the DEP IBM mainframe and personal computers. ERDAS software is also operating on both the Prime and Personal Computers. The GSAU provides support for all DEP divisions. The GSAU serves as a coordinator for systems administration, database administration, training and technical support, and applications development.

Coordination Activities

The DEP heads New Jersey's coordination efforts. The state has had a State Mapping Advisory Committee (SMAC) since 1979, whose members represent state and local governments and the private sector. The Committee meets quarterly and serves as a coordination mechanism and forum for exchanging ideas and discussing mapping issues. The SMAC has a GIS Subcommittee. The major goals and tasks of the GIS Subcommittee are to:

- Inventory and document all geographic data on various GIS around the state to provide a base to disseminate information about each agency's data sets.
- Develop a set of guidelines for distributing digital data to interested parties.
- Work out the technical details of transferring data from one GIS configuration to another.
- Develop standards for new data sets with a set of guidelines for creating them.
- Cooperatively develop data sets for which many agencies share a need.

DEP also has a GIS Users Group which serves as a forum for users to compare experiences.

NEW MEXICO

University of New Mexico
Technology Applications Center (TAC)
Albuquerque, NM 87131
Contact: Mike Inglis, Associate Director
(505) 277-3622

Technology Infrastructure

GIS activity has been strong for over three years at the University of New Mexico's Government Research Division. The Research Division runs ARC/INFO software on a MicroVAX computer. In addition, the Technology Applications Center (TAC) of the University functions as a NASA Industrial Applications Center to assist in commercializing the national program for space especially in the areas of remote sensing and image dissemination. The mission of TAC is education and expansion of user awareness. Both the Division and TAC use ARC/INFO software and ELAS for client projects. GIS activities within state agencies has been limited to date.

Coordination Activities

With leadership from the University of New Mexico, broad coordination activities regarding geographic information have been in development since 1984. The New Mexico Geographic Information Council (NMGIC) was organized by representatives of state, federal, local agencies, universities, and private industry interested in the "development and availability of geographic data and information within the state." It was made official by an executive order adopted in 1987. In November, 1989 the NMGIC was incorporated as a non profit corporation. The goals of NMGIC are to promote cooperation and coordination of programs, policies, technologies and resources, and to provide recommendations to state, federal, and local agencies on New Mexico geographic data needs, priorities and standards. Activities include education, cooperation, recommendations and proposal of strategies to local, state and federal agencies and offices regarding New Mexico geographic needs, priorities, and standards. NMGIC is guided by a steering committee, and includes committees on public awareness, state mapping, global positioning systems, geographic names, GIS, and local government land records.

During the same time that the NMGIC was being organized, a need was recognized for some clearinghouse, education, technology transfer, and other activities regarding GIS in the state. The University developed a proposal to conduct this work, and a feasibility study was authorized by legislation in 1988. It stated that a Resource GIS (RGIS) was to provide a comprehensive, state-of-the-art, automated GIS clearinghouse for use as a management, planning and analysis tool. The function of the clearinghouse will be to network GIS in the state to share, retrieve and integrate data to support state economic and resource development, policy development and strategic planning; promote technically sound procedures and practices to facilitate the modernization of state and local mapping and database management procedures; and resolve existing duplication, conflicts and gaps in statutory and administrative provisions. Efforts to fund the clearinghouse initiative are underway.

NEW YORK

Department of Taxation and Finance
Division of Equalization and Assessment
16 Sheridan Avenue
Albany, NY 12210
Contact: Bill Pauquette
(518) 474-6742

Technology Infrastructure

New York has a variety of GIS activities underway. The Division of Equalization and Assessment (DOEA) was the first agency in the state to acquire GIS capabilities with the purchase of ARC/INFO software in 1983. It is now operating on a Prime 9750 computer as well as on a SUN and a personal computer. The largest GIS in state government, it is named the Real Property Information System (RPIS). The goal of RPIS is to ensure that assessments are computed correctly and appraisal values correspond with actual land values. It is being used to develop base maps and parcel centers for property ownership mapping needed as a base to display evaluation data, assist in assessment administration, and project future activity and growth. The majority of other GIS activity is emerging in the natural resources agencies.

Coordination Activities

DOEA serves as a de facto lead with both state and county agencies. At the state level, DOEA promotes data sharing, conducts special demonstration projects, and serves as a catalyst. DOEA also helps counties do reevaluations and conducts special projects for them while also providing advice to counties.

In 1986, the Department of Environmental Conservation convened an ad hoc group of state and local agencies and academic institutions to begin the Ad Hoc Committee on GIS Systems. In 1988, some of these efforts were moved to the formation of a New York State URISA Chapter headed by Robert Kitchen, Deputy Executive Director for Operations of DOEA. They have sponsored annual meetings attended by more than 200 people, with participation from all levels of government, academia and private sector. Topics of interest presented at the last meeting included integration issues, such as data exchange, standards, remote geoprocessing, remote sensing, security and Freedom of Information Act concerns. This informal group has also initiated an ARC/INFO software users group and, recently, a PC ARC/INFO software users group.

NORTH CAROLINA

Geographic Information and Analysis Center
Department of Environment, Health and Natural Resources
P.O. Box 27687
Raleigh, NC 27611
Contact: Karen Siderelis, Director
(919) 733-2090

Technology Infrastructure

The Department of Environment, Health, and Natural Resources (DEHNR) has one of the most extensive set of state programs in the country regarding geographic/land information. The DEHNR Division of Land Resources has five important programs.

The first program is the North Carolina Land Resources Information Service (LRIS) which has existed as a GIS since 1977 through the North Carolina Land Policy Act of 1974. The legislation marked out a statewide land use policy and stated that the "lack of systematic collection, classification, and utilization of information regarding the land resource" was an impediment to the implementation of such a policy. An information system was directed and, through the appointed Land Policy Council, LRIS was established.

LRIS was renamed the State Center for Geographic Information and Analysis (SCGIA) in 1989. Today, the SCGIA functions department-wide, with linkages to other state agencies. The mission of SCGIA includes the building and maintenance of a "database of digital geographic information" for the state, and to provide GIS services for all of state government, federal, regional, county and local government agencies, and the private sector. In 1977 SCGIA purchased GIS software from Comarc Design Systems, and in 1986 SCGIA installed ARC/INFO software which includes TIN and NETWORK. SCGIA also used Dynamic Graphics' Interactive Surface Modeling (ISM) software and ERDAS software. Previously operating on Data General equipment, SCGIA now operates on a SUN file server and workstation network that is connected to the state IBM mainframe via SNA.

The second program of the DEHNR Division of Land Resources is the Land Records Management Program, established in 1977 by the General Assembly to assist county governments in updating their methods of maintaining land records. Assistance is provided in development of base maps and cadastral maps, (including orthophotos or planimetric maps), establishment of uniform parcel identifier numbers, and creation of a central index place in the Register of Deeds' office, the Tax Supervisor's Office, or in the office of a land records manager. The program also serves as a clearinghouse of activities at the county level. Matching grants are provided for mapping, hardware and software.

Coordination Activities

Even though the DEHNR has extensive activity underway in both GIS and land information system programs for county governments, a broad statewide coordination entity or group does not exist. The managers of the two DEHNR programs and the GIS manager of the state Department of Transportation meet on a regular, informal basis resulting in improved coordination and programs without a specific directive to do so. One result of this effort has been one of the few agreements between a state natural resources agency and a state DOT. In 1989 these agencies agreed to work together toward "Development, Maintenance, and Shared Use of A Statewide Digital Map Base."

NORTH DAKOTA

Office of Management and Budget
Division of Information Services
600 East Boulevard
Bismarck, ND 58505-0100
Contact: Al Veit, Chair, GIS Technical Committee
(701) 224-3190

Technology Infrastructure

The only GIS in the state is at the University of North Dakota's Geography Department. Seed money of $60,000 from the University helped the Geography Department acquire a grant from Intergraph Corporation for hardware and software. The system is intended to be used for education and technology transfer.

Coordination Activities

Although no state agency has developed GIS capabilities to date, coordination efforts began in 1988 with informal meetings. An ad hoc group, the GIS Technical Committee, was formed in April 1989 after about a year of discussions. The first official meetings were held in September and November 1989 to organize the Committee. Members of the Committee include representatives of state agencies related to natural resources, the Department of Transportation, and the Public Service Commission; federal agencies including U.S. Geological Survey, the U.S.D.A. Soil Conservation Service, Bureau of Reclamation, and the Bureau of Land Management; and representatives of the University of North Dakota and North Dakota State University. At the November 1989 meeting, it was decided to conduct a survey of state and federal agencies to inventory activities, and second, to request the formation of a GIS Management Group.

The Chair of the Committee is Al Veit, from the Information Services Division.

OHIO

Department of Administrative Services
Division of Computer Services
30 East Broad
Columbus, OH 43266-0409
Contact: Ronald Vidmar
(614) 466-7487

Technology Infrastructure

Ohio has had a variety of GIS activities underway since the 1970s. The Department of Natural Resources's (DNR) Division of Soil and Water Conservation has the Ohio Capability Analysis Program (OCAP). OCAP is a grid based system that has existed since 1973 with software that was developed in-house to help in land use planning and tax assessment. Regional questions were answered by the system on a cost sharing base. OCAP began using ARC/INFO software on a VAX computer in 1988 and also uses PC ARC/INFO software. The Ohio Environmental Protection Agency (OEPA) began its GIS efforts in 1975, with the purchase of ADAPT (Areal Design and Planning Tool). The Planning and Engineering Data Management System for Ohio (PEMSO) became operational in 1979. It is used for environmental monitoring and modeling. Unlike OCAP, PEMSO has a database with full coverage of the state, and it conducts work only for its own use.

Coordination Activities

State coordination activities have been in place for more than a year. After cabinet officials in numerous state departments expressed interest in a coordinated effort, the Ohio Geographically Referenced Information Program (OGRIP) was created by the Director of the Department of Administrative Services (DAS) in April 1989 at the request of the Governor's Office. An OGRIP Advisory Committee was formed, to recommend policies for the establishment and development of an OGRIP. The basic purpose of OGRIP is to "serve the needs of State of Ohio agencies, agencies of other Ohio political subdivisions, and related private sector organizations for coordinated and efficient collection, management, and use of geographically referenced, digital information."

OGRIP's Advisory Board has 19 representatives, including legislative staff and state agencies such as Natural Resources, Transportation, Development, the PUC, the state EPA, and the Secretary of State. Others members represent the Utility Associations, Municipal League, County Auditors, County Commissioners, County Engineers, Ohio State University, and the USDA Soil Conservation Service. Subcommittees include standards and policies, architecture, users and uses, costs and benefits, and operation and coordination. The subcommittees are meeting regularly and working on individual projects and proposed documents.

OKLAHOMA

Department of Tourism and Recreation
500 Will Rogers Building
Oklahoma City, OK 73105
Contact: Michael L. Moccia, Deputy Director
Chairman, GIS Committee
(405) 521-2471

Technology Infrastructure

GIS development in Oklahoma is in its infancy at state government, while both the University of Oklahoma and Oklahoma State University have ARC/INFO software in place. The Oklahoma Department of Agriculture is investigating the development of a GIS.

Coordination Activities

Though little GIS activity has occurred to date, the newly formed Natural Resources Cabinet leadership recognized that various natural resources agencies were requesting appropriations for GIS. After consulting with the Governor's Office, the Cabinet director sent a letter to various agency directors in and outside this Cabinet asking them to work on a Natural Resources GIS Committee. The letter stated that the objective of the committee was to "evaluate and recommend the selection of a state GIS which could meet the needs of all the Natural Resources Cabinet agencies." It was informally concluded that the Natural Resources Cabinet should coordinate statewide GIS activities. This informal group met for the first time in January, 1990. Members include state natural resources agencies (Water Resources Board, Public Lands, Conservation Commission, Department of Mines, etc.), Office of State Finance, State Census Data Center, legislative staff, representatives of Oklahoma State University and University of Oklahoma, and the Soil Conservation Service and U.S. Geological Survey.

Objectives of the Committee include coordination, implementation and use of GIS technology by Natural Resources agencies, prompt access to GIS for potential users, promotion of compatibility and standards for geographic information, data sharing, reduction of costs that would be involved with independent activities, enhancement of information analysis and decision making, and development of a state directory and standardized statewide automated maps. Four Subcommittees were organized at the meeting and each was asked to develop a list of objectives.

OREGON

Department of Energy
625 Marion St, NE
Salem, OR 97310
Contact: Scott Smith
(503) 378-4163

Technology Infrastructure

Oregon began working with GIS in the early 1980s and now has activity in more agencies than any other state of similar population. The Department of Energy (DOE) initiated GIS activities in 1983 on a Data General computer with MOSS software in conjunction with the Department of Land Conservation and Development. The original purpose for the GIS was the DOE's Coastal Energy Impact Program which involved analysis of energy related impact on the coastal zone. The DOE switched to ARC/INFO software in 1985, and the system currently operates on a Prime 2655. Efforts to switch to SUN workstations are underway. In 1989 the GIS facilities became the statewide GIS Service Center which is a separate administrative entity and service bureau. The purpose of the Service Center is to provide a digital database for the development and administration of digital data and to provide products and assistance. Various projects are underway with state and federal agencies.

Coordination Activities

Oregon has a long history in GIS and is one of the most progressive states regarding geographic information coordination. The State Map Advisory Committee (SMAC) was originally established in 1977. In 1986, an executive order created the Land Information Advisory Committee (OLIAC). In 1987, another executive order merged SMAC & OLIAC into the State Map Advisory Council (also SMAC), with the purpose of strategic planning, resolving policy and technical issues, providing technical assistance and coordination, and fostering interagency and intergovernmental cooperation. Members include up to 12 members appointed by the Governor from state agencies, and up to six-non voting members from federal and local agencies. The SMAC adopted various goals, strategies, policy statements and plans of action in 1988 and early 1989.

Another executive order in October 1989 mandated coordination and gave specific roles and duties to the agencies and SMAC, as well as stating that a statewide geographic information database be developed and that a plan be completed to do so. Also, certain agencies would be designated by SMAC to be responsible for individual data layers, and GIS must be compatible with statewide information processing and communications activities. In addition, agencies are required to work with SMAC and the GIS Service Center in their development of GIS and associated data. Various SMAC projects are underway to build coordination, and a plan and draft standards were recently adopted.

A state and federal agencies group, the Northwest Land Information Systems Network (NWLISN), was established in August 1987 through an agreement among agencies in Oregon and Washington. It includes federal agencies such as the U. S. Geological Survey, the Bureau of Land Management, the Bureau of Indian Affairs, the Bonneville Power Administration, the Soil Conservation Service, the U.S. Forest Service, the U.S. Fish and Wildlife Service, and the Army Corps of Engineers. The purpose of NWLISN is to provide natural resources agencies with an organized way of sharing data.

PENNSYLVANIA

Governor's Policy Office
506 Finance Building
Harrisburg, PA 17120
Contact: James Wheeler
(717) 787-5243

Technology Infrastructure

GIS activities have recently begun in the state. Available information, limited because no inventory has been conducted by the state, indicates that no major GIS facilities are located in state agencies. The Department of Transportation has historically been one of the nation's most active state transportation departments doing Computer Aided Design (CAD) with Intergraph software. Proposals for DOT's GIS are being reviewed by other state agencies to provide for their input. The Department of Environmental Resources is working to integrate its environmental information. Other agencies are beginning to develop GIS capabilities but without major resources.

Coordination Activities

The need for coordination of GIS activities was recognized by various agencies as well as by the Governor's Office in 1988. Representatives of the Department of Agriculture, the U.S. Geological Survey and state agencies met informally and developed a pilot project to show how GIS could be used for economic development. It was presented to the legislature. Based on this effort, the GIS Interagency Work Group (GISIWG), an informal committee of policy and technical representatives of state agencies, was organized in the fall of 1988, sponsored by the Governor's Office. The GISIWG was formed to increase interagency coordination of technology acquisition and data sharing, and specifically to:

- Formulate a state-wide GIS implementation methodology.
- Foster cooperation among state agency GIS activities.
- Eliminate duplication of effort among state agencies in digitizing information.

- Enhance data sharing between state agencies by identifying and adopting standards for use in digitizing information.

The primary goal of the GISIWG is to work to toward a state-wide GIS implementation policy that would give agencies a base to determine their individual GIS needs, to detail appropriate technology solutions, to set priorities and to assess costs. One focus of the GISIWG is to develop a policy requiring compatible GIS systems among agencies. Cooperative purchasing arrangements are also planned. GISIWG is also studying how to increase information sharing by developing a directory. Thus far, GISIWG has helped increase the dissemination of educational information about GIS in the state.

PUERTO RICO

Office of the Governor
Puerto Rico Planning Board
Manillas Governmental Center
San Juan, PR 00940-9985
Contact: Carlos Paniagua, Planning Board
(809) 722-1705
Alejandro Candelario, Natural Resources Department
(809) 724-8774

Technology Infrastructure

Puerto Rico recently began the development of a GIS. The GIS Office of the Planning Board uses Informap II database manager and Infoplot software on two MicroVAX computers. A pilot project of the Santurce area is underway to test the capabilities of the software. The Commonwealth is in the process of acquiring the topographic maps of Puerto Rico from the U.S. Geological Survey and will be entering infrastructure information from these maps into the system during 1990. The Natural Resources Department is also beginning to work with GIS. In addition, the Graduate School of Planning at the University of Puerto Rico is working with GIS. Carlos Paniagua is the coordinator of the GIS activities in the Planning Board.

Coordination Activities

The Planning Board and Department of Natural Resources are working together in the above plans, including developing longer term goals.

RHODE ISLAND

Department of Administration
Division of Planning
265 Melrose St
Providence, RI 02907
Contact: John Stachelhaus, GIS Coordinator
(401) 277-6483

Technology Infrastructure

GIS activities began in 1984 when the Department of Environmental Management (DEM) became interested in GIS as a tool for managing the state's land and natural resources. A feasibility study was conducted for DEM in early 1984 that described potential GIS uses and needs. The Rhode Island GIS (RIGIS) was created in 1984 in a partnership agreement between DEM and the University of Rhode Island's Department of Natural Resources's Environmental Data Center (EDC). The EDC runs ARC/INFO software on a Prime 9955 which was installed in 1986. The EDC also assimilates data and serves as the center for technical expertise.

Coordination Activities

Statewide GIS coordination has grown from the DEM and university partnership effort. RIGIS has evolved into a five agency project, including the two founding members, plus the Department of Transportation, the Solid Waste Management Corporation, and the Department of Administration's Division of Planning. All of these agencies are now contributing toward system operations or database development.

RIGIS is directed by the RIGIS Executive Committee which consists of representatives of these five agencies. The Committee is ad hoc at this time but efforts are underway to make its role more official and to strengthen coordination efforts. It has been proposed that the Division of Planning be strengthened by officially designating it to administer the RIGIS. The Division currently has a full time GIS Coordinator.

The Comprehensive Planning and Land Use Regulation Act of 1988 mandated that all cities and towns within the state must develop comprehensive plans for land use, preservation, and development. Funding was made available to assist municipalities to meet this requirement. The Act stated that the Division of Planning would administer the program and provide municipalities with information from available state sources including the RIGIS database. A data catalog, and data priorities and standards have been developed by the RIGIS Committee.

SOUTH CAROLINA

State Development Board
P.O. Box 927
Columbia, SC 29202
Contact: William Shinar
(803) 737-0400

Technology Infrastructure

South Carolina contracts with the University of South Carolina to provide GIS services to the state. During the 1987-88 session, the South Carolina General Assembly authorized the Coordinating Council for Economic Development, which includes directors of eight of the largest state agencies related to economic development, to develop and implement an infrastructure and economic development project. This project was a part of the "Strategic Highway Plan for Improving Mobility and Safety" (SHIMS), undertaken to foster economic growth through major improvements in the state highway system. The Council designated the South Carolina Development Board to be the project coordinator. The Development Board decided to use GIS to help with infrastructure analysis and planning, and funds were allocated for this purpose and to help provide for statewide GIS development. The Development Board contracts with the University of South Carolina to provide these capabilities. The University uses ARC/INFO software on a SUN computer which is linked with workstations at the Development Board.

Coordination Activities

The SHIMS project provides a base for statewide coordination in South Carolina. Part of the Council's role has been to develop policies related to general information activities to support economic development missions. The SHIMS implementation plan includes data definitions and classifications and a development schedule.

The State Mapping Advisory Committee was formed by executive order in 1978, and has been recently invigorated. Its main purpose has been to help build a map base for the state. SMAC is coordinating operational aspects and serving as an information exchange forum. An SMAC Conference was held in January 1990 and brought representatives from various agencies together for the first time to see what GIS activities are underway. Subcommittees have been organized to address computer applications, geodetic control, tax mapping, and topographic mapping. Issues being discussed include standards and freedom of information. De facto statewide standards are being developed by the Development Board as it is the quasi-official lead for GIS.

SOUTH DAKOTA

Department of Water & Natural Resources
Foss Building
Pierre, SD 57501
Contact: Ron Woodburn
(605) 773-4750

Technology Infrastructure

The Department of Water and Natural Resources was the recipient of a Prime computer and ARC/INFO software from the EPA in April 1990. The GIS will be used to help complete national water databases while also meeting some state needs. South Dakota State University Engineering and Environment Research Center has PC ARC/INFO software, and has a number of projects underway including a study and pilot project with the state.

Coordination Activities

A GIS Advisory Committee was formed in 1988, that includes the Departments of Water and Natural Resources; Education; Transportation; School and Public Lands; Agriculture; Finance and Management; and Game, Fish and Parks. At this point the group is ad hoc. The state contracted with the Engineering and Environment Research Center at South Dakota State University to help the state determine its future direction. Phase I of the determination, begun in February 1988, conducted a review of the technology, user needs assessment, requirements analysis, and conceptual model development. Phase II is underway and addresses implementation planning and design finalization as well as pilot applications. The Committee is working with the University in the development of this report.

TENNESSEE

State Planning Office
500 Charlotte Avenue, Room 307
Nashville, TN 37219-5082
Contact: Charles Brown
(615) 741-1676

Technology Infrastructure

Tennessee has had a statewide approach GIS in place since 1985. Operational responsibility for the statewide GIS rests with the Wildlife Resources Agency (TWRA). Initiated in 1985, the TWRA GIS is now using ARC/INFO, ERDAS, PC ARC/INFO, and EPPL-7 software on a Prime 9750 computer. TWRA is responsible for providing management and development of the GIS and building data sets of land use, soils, socioeconomic, agriculture, forestry and other layers. Efforts are currently underway to obtain state base map layers for boundaries, transportation and hydrography. The system is used for a variety of wildlife management projects on a statewide scale to model habitat loss and gain. It was the first state wildlife agency to use ERDAS and ARC/INFO software together.

Coordination Activities

Tennessee began developing a statewide approach to GIS in 1983. The State Planning Office (SPO) is the official coordinating entity for GIS in the state. The FY83-84 General Appropriations bill called for the establishment of the nine member Select Committee to Study a Statewide GIS to conduct an analysis of the scope, operation, and location of a GIS for the state. The 1984 study recommended that the GIS be housed at TWRA, that overall supervision of the GIS should be the responsibility of the Information Systems Council and that a GIS User's Committee, chaired by the Director of State Planning Office, would be responsible for leading coordination. All agencies would be represented on the GIS User's Committee, and the State Planning Office would be the point of contact between agencies and the Information Systems Council.

During the summer of 1987 a reinvigorated GIS Users Committee met to discuss GIS conditions in the state and established a subcommittee to index public users of GIS in the state. The Water Resources Division of the U.S. Geological Survey, the Tennessee State Planning Office and the Tennessee Comptroller of the Treasury, whose Division of Property Assessments is responsible for property tax assessment mapping, conducted a survey to determine state mapping needs, standards, digital data and GIS in the state, including federal, state, and local governments. This effort resulted in the "GIS Index for the State of Tennessee," published in 1989. The GIS Index also includes suggested standards for digital data.

TEXAS

Water Development Board
Texas Natural Resources Information Systems (TNRIS)
P.O. Box 13231
Austin, TX 78711-3231
Contact: Charles Palmer, Manager, TNRIS
(512) 463-8402

Technology Infrastructure

Texas was one of the first states to develop GIS capabilities, and now a growing number of agencies are implementing the technology. During the 1960s the Texas Water Oriented Data Bank was developed out of a statewide, legislatively-recognized need to coordinate water related activities in response to droughts followed by floods. In order to accommodate a larger focus, the Texas Water Oriented Data Bank became the Texas Natural Resources Information System (TNRIS) in 1973. TNRIS was located in the Water Resources Department until 1985 when reorganization created the formation of two water agencies: the Water Commission, which took with it most of the old in-house GIS, and the Water Development Board, which kept TNRIS. Both agencies now have GIS capabilities. TNRIS originally used software that was developed in-house; in 1988 TNRIS purchased PC ARC/INFO software that runs on an AT&T 6386e workstation. The procurement of workstation ARC/INFO software was recently authorized.

Coordination Activities

TNRIS serves as a mechanism to foster coordination among natural resources agencies regarding related information and GIS. It is a clearinghouse for digital data and reformatting translation as more and more agencies acquire GIS. There is a directive for TNRIS, but it is not statewide, nor does it have any official coordination or enforcement role beyond its specific mission, and it has received less support and resources in recent years. In the future it is expected that project work and service bureau missions will be at a minimum, because staff and budget allocations are decreasing, but that educational and referral roles will grow.

The TNRIS Task Force meets six times per year to discuss issues and activities. Members include representatives of 15 state agencies. TNRIS also serves as a State Mapping Advisory Committee (SMAC) to provide input to the U.S. Geological Survey regarding mapping priorities. A GIS user group exists in the Austin area. It is attended by representatives of public agencies at all levels of government and the private sector.

UTAH

Office of Planning and Budgeting
Data Processing Coordinator's Office
116 State Capitol
Salt Lake City, UT 84114
Contact: Brent Jones, GIS Coordinator
(801) 538-1027

Department of Administrative Services
Division of Data Processing
State Office Building, Room 5000
Salt Lake City, UT 84114
Contact: Dennis Goreham, Automated Geographic Reference Director
(801) 538-3450

Technology Infrastructure

Utah has been working with GIS for almost a decade. The Automated Geographic Reference (AGR) Center was initiated in 1981 and was located in the Department of Natural Resources until 1986. At that time the AGR was transferred to the Office of Planning and Budget because it was considered that better and neutral services could be provided in this office. The mission of the AGR Center was defined to "encourage and facilitate effective GIS implementation in Utah and develop and direct this process in state government." The AGR Center served as both a GIS coordinator and "implementation authority" that provided services to all levels of government.

In November 1989 the two functions of coordination and service bureau were separated organizationally. The AGR Center is currently located in the Division of Data Processing (DDP) and operates as a service bureau that provides GIS services on a fee for service basis. Services include consultation, technical assistance, training, initiation and coordination of cooperative projects among state, federal and local agencies, as well as contract services such as needs assessments, project and production management, and geographic data modeling and analysis. The state GIS database is also maintained by AGR. AGR runs ARC/INFO software, EPPL-6, ELAS, and DTAP-Terrain on a Prime 4150 computer with 17 terminals. Various agencies have terminals accessing the AGR Center Prime which has been networked to the DDP's IBM mainframe and telecommunications system.

Coordination Activities

Utah has had a statewide coordination focus and effort since the early 1980s. The location of the AGR Center in the Office of Planning and Budgeting since 1986 facilitated coordination efforts, however the perceived differences between service and coordination contributed to the fall 1989 reorganization described above. With the reorganization, a new position, that of GIS Coordinator, was established in the State Data Processing Coordinator's Office in the Office of Planning and Budget. (In the past, this coordination function was part of the AGR Center Manager's role.) The role of the GIS Coordinator is to coordinate planning for GIS activities in state government, assist state agencies in developing a strategy, plan and budget for implementing GIS, promote GIS research and development, increase the awareness and understanding of state government about GIS, encourage data exchange and cooperatively funded initiatives, GIS policies, procedures and standards.

Utah has an active State Mapping Advisory Committee (SMAC), whose primary purpose is to provide input to the U.S. Geological Survey for mapping priorities. It is envisioned that the GIS Coordinator will staff a GIS Advisory Committee whose role will probably be to review proposed GIS policies, procedures and standards, recommend priorities for data collection, review legal and policy issues related to data access, and make recommendations to clarify unresolved issues.

VERMONT

Agency of Administration
Office of Geographic Information Services
120 State Street
Montpelier, VT 05602
Contact: David Healy, GIS Operations Manager
(802) 828-3326

Technology Infrastructure

The University of Vermont's School of Natural Resources has been working with GIS since the late 1970s. In 1982 the School of Natural Resources became the first place in New England to use ARC/INFO software, which they currently operate with ELAS software on a VAX 11/750 and several AT&T PC 6300s. The initial focus of their GIS research was on natural resource management, particularly forests and soils.

State government is now in the process of developing a statewide GIS as mandated by the Growth Management Act that was adopted by the legislature in 1988. GIS was specifically mentioned in the Act as one of the goals to assist local governments. As a result, an Office of Geographic Information Services (OGIS) was established in the Agency of Administration (AOA) by executive order in June 1989. After various analyses, including pilot projects located at the University, a request for a proposal will be issued in 1990 for the first phase of the implementation of the Vermont GIS (VGIS).

Coordination Activities

"Act 200: The Growth Management Act Relating to Encouraging Consistent Local, Regional and State Agency Planning," was adopted by the legislature in 1988 after extensive effort by various parts of state government. Act 200 calls for growth planning at all levels to occur in harmony, and includes procedures and requirements for planning at the town, regional and state level. It provides that the governor develop a comprehensive strategy for the development and use of GIS. The strategy inludes "data and mapping standards; potential applications and their priorities, priorities for collecting and digitizing information; geographic location standards for all data collection; software and hardware needs; management needs; private sector cooperation; costs and benefits of use; financing considerations; ways to make information gathered available to regional and municipal entities; ways to assure that data gathered by regional and municipal entities conforms to the geographic information system; and an implementation schedule." It also calls for compatibility by all state agencies to the GIS established by the Act.

The governor appointed the Secretary of Administration (AOA) to be responsible for implementing the statewide GIS. After an organizational study, the Office of Geographic Information Services (OGIS) was established in the AOA to serve in a coordination role. The VGIS is guided by the Vermont GIS Advisory Board which was created in 1988 and chaired by the Deputy Administrator of the AOA. The Advisory Board makes policy and contractual decisions and recommendations. The 15 member group includes department commissioners, agency secretaries, and the executive directors of the Vermont League of Cities and Towns, Vermont Association of Planning and Development Agencies, and the Vermont Business Roundtable. The VGIS Advisory Board adopted "digitizing Data" and "map coordinate system" standards in November 1989, two of a planned 13-part Standards and Procedures Handbook.

Various activities already underway to build the VGIS including a resource catalog, statewide meetings, data priority setting, pilot projects and a program to provide GIS capabilities and technical assistance to regional planning agencies.

VIRGIN ISLANDS

Department of Planning and Natural Resources
Nisky Center - Suite 291
No. 45-A Estate Nisky
Charlotte Amalie, St. Thomas, VI 00802
Contact: Keith Richards
(809) 774-3320

Technology Infrastructure

There is currently no GIS technology in place in the Virgin Islands. However, the Government of the Virgin Islands is developing a long-range Comprehensive Development Program in response to Hurricane Hugo, problems caused by rapid growth, and infrastructure problems. GIS is seen as an essential tool to facilitate this program. The Department of Planning and Natural Resources is responsible for the program and the accompanying planned GIS activities.

Coordination Activities

The Department of Planning and Natural Resources (DPNR) has been attempting to conduct coastal planning and land use management including development control proposals. Hurricane Hugo interrupted planning, but made its implementation more urgent, and in some ways more feasible because it was more strongly recognized that an information system is needed. A proposal has been developed to acquire a pc-based GIS and some digital data. The plan includes an assessment of data availability and needs, and an action plan for implementation. It also includes the establishment of a GIS Center at the University of the Virgin Islands. Improved planning, streamlining the development permitting system, and preventing damage to the environment are the major objectives of this effort. It is foreseen that the GIS could result in numerous savings including more efficient government operations and improved services. In addition, GIS is foreseen as an economic development tool and service that could assist private companies because they could purchase maps, or rent or access the computer from the government. The GIS will also help build "the base for a new geographic locator system that will simplify the task of the recorder of deeds, census and anyone else who must locate a specific plot of land." It is also anticipated that the GIS would aid health planners in locating new clients and identifying and managing both natural and man made health hazards. Emergency dispatchers could also better locate destinations and an appropriate route.

VIRGINIA

Department of General Services
Division of Land Information Services
805 E. Broad Street
Richmond, VA 23219
Contact: Charles E. McNuldy, Chairman, Mapping Advisory Commission
(703) 335-6845

Council on Information Management
Washington Building, Suite 901
Richmond, VA 23219
Contact: Charles Tyger, Computer Systems Chief Engineer
(804) 225-3622

Technology Infrastructure

GIS activity in Virginia is concentrated in the Department of Conservation and Recreation's Division of Soil and Water Conservation. The Division uses ARC/INFO software on a Prime computer, and is also networked with Virginia Polytechnic Institute and State University. The Division is developing the VirGIS database and has various pilot projects underway, including evaluating methods of targeting non-point source pollution sources, methods of land use determination, and methods for pollutant load reduction estimates. The Council on the Environment uses the Department of Conservation and Recreation's ARC/INFO software and also has PC ARC/INFO software. A variety of other agencies have expressed interest in GIS and are developing capabilities.

Coordination Activities

Virginia has a relatively long and comprehensive approach to the coordination of geographic information activities which initially focussed on local government surveying and mapping activities, and more recently has included state agencies and other activities as well. Based on the recommendations of a 1986 legislative study, the 1987 Session of the Legislature established the Division of Mapping, Surveying and Land Information Systems in the Department of General Services. The purpose of this office is to provide technical advice and assistance to local governments and planning agencies for improving land records and land information systems; to promote the development of voluntary standards for such systems; to provide for training programs; and to serve as a clearinghouse for information. The director of the Division is known as the "State Coordinator" and began work in February 1989. The State Coordinator is responsible for ensuring the availability of the availability of federal, state, or other sources of map products, aerial photographs, digital databases, surveying and natural resource information, and other related resources. An Advisory Commission on Mapping, Surveying and Land Information Systems was created to assist the State Coordinator in the development of model standards and to otherwise advise and consult with the Coordinator on the activities of the Office. The Commission consists of 12 members who are appointed by the Governor and mainly include representatives of professional societies, two from local governments, one from a utility, one from the private sector, and one from the general public, but none from state government.

The 1989 Legislature appropriated funds for the Council on Information Management (CIM) to "conduct a study of geographic and biological land-use information or mapping systems developed or operated by agencies and institutions of the Commonwealth." The purpose of this study was to assess the need and utility of such systems, identify opportunities for system integration and shared usage, make recommendations for operational improvements, and develop a plan for the coordinated operation and development of such systems. In December 1989 the CIM published a progress report that was built from a survey of all state agencies. An additional study is underway in 1990 to analyze the survey and patterns of information use among state agencies. It will include the role of local governments and regional planning districts in the Commonwealth's overall commitment to Land Information Systems, organizational structures and the need for formalized state level standards, policies and procedures for dealing with Land Information Systems related activities.

WASHINGTON

Department of Natural Resources
EV-31
Olympia, WA 98504
Contact: Larry Sugarbaker, GIS Manager
(206) 753-1262

Department of Natural Resources
Resource Mapping Section AW-11
1065 South Capitol Way
Olympia, WA 98504
Contact: Christine Reinhard, State Cartographer
(206) 753-5340

Department of Information Services
1110 S.E. Jefferson Street
Olympia, WA 98504-8111
Contact: David Andreson, Washington Geographic Information Council
(206) 586-5555

Technology Infrastructure

Washington's Department of Natural Resources (DNR) has one of the largest and oldest GIS systems in the United States. Developmental work on GIS began as early as 1955 with a forest mapping program and these efforts continued into the 1970s. Preliminary analysis for a department wide system began in 1979. The Geographic Multi-use Analysis and Planning System (GEOMAPS) was initiated in 1984. Currently, the system is on-line at the central office in Olympia and divisions access it through dedicated phone lines. It is using ARC/INFO software on a Prime 9955. Other state agencies have also acquired GIS capabilities in recent years.

Coordination Activities

Geographic information coordination has been a goal and endeavor in Washington for over a decade, particularly for natural resources and land use information. In the early 1970s attempts were made to develop a statewide landuse database and authority for statewide base mapping, both of which had legislation giving the DNR responsibility, but without regulatory authority or funding. The DNR also has one of the few State Cartographers in the country. Before 1987 this person concentrated on facilitating coordination and building the state's cartographic resources, but more recently the role of this position has moved to marketing DNR's conventional and digital cartographic data, aerial photography, orthophotoquads and related natural resources geographic data. Accomplishments in statewide coordination include agreements signed by several federal and state agencies to facilitate the exchange of geographic data.

In addition, a number of groups exist to facilitate coordination in Washington. A State Mapping Advisory Committee (SMAC) was organized in 1978 in response to legislation requiring a state mapping program. The State Cartographer chairs the SMAC which was rejuvenated in 1987 and sponsored a GIS symposium in September 1989. A Global Positioning System (GPS) technology users group has existed since 1988 and is affiliated with SMAC. A GIS users group also exists. A state and federal agencies group, the Northwest Land Information Systems Network (NWLISN), was established in August 1987 through an agreement among agencies in Oregon and Washington.

In 1989 the Department of Information Services (DIS) convened a steering Committee of seven state agency division representatives to develop a Washington Geographic Information Council. The purpose of the Council will be to promote coordination and serve as a policy group for GIS among other activities. A draft charter and bylaws is under review and is expected to be finalized during 1990.

WEST VIRGINIA

Department of Commerce, Labor and Environment
State Capitol R-150
Charleston, WV 25305
Contact: Joe Thomas
(304) 348-0350

Technology Infrastructure

The state government was recently reorganized into seven Secretaries, including the Commerce, Labor and Environmental Resources (CLEAR) Secretary which includes the Departments of Natural Resources, Energy, Labor, and Community Development. The Department of Natural Resources (DNR) has recently acquired PC ARC/INFO software. The software was installed in 1989 and is being used to inventory water resources. A staff person was recently hired to develop an information system for the entire department and is considering GIS as a way to help do so.

Coordination Activities

Efforts to consider GIS and its coordination are just beginning to emerge. The CLEAR Secretary is trying to pull together activities there, and a survey is being distributed to each part of CLEAR to assess activities in each department regarding information technology. In addition, an informal working group of professionals in various agencies has proposed a West Virginia Data Base. The idea is that the Data Base could be linked with the proposed West Virginia Telecommunications plan and network.

WISCONSIN

Department of Natural Resources - Information Management
101 South Webster
1st Floor, GEF 2
P.O. Box 7868
Madison, WI 53707
Contact: Paul Tessar, GIS Manager
(608) 266-3054

Department of Transportation - Information Management
4802 Sheboygan Avenue
P.O. Box 7915
Madison, WI 53707-7915
Contact: David Fletcher, GIS Manager
(608) 266-1357

Wisconsin Land Information Board
101 South Webster Street
6th Floor, GEF 2
P.O. Box 7868
Madison, WI 53707-7868
Contact: William Holland, Director
(608) 267-2707

Technology Infrastructure

The Department of Transportation (DOT) is one of the oldest users of digital mapping and GIS in the state, and currently has the largest GIS configuration in the state. DOT is using both Intergraph and ARC/INFO software and will soon be upgrading from a Micro VAX computer version to using ARC/INFO software on APOLLO workstations. The Department of Natural Resources (DNR) has a department-wide GIS system managed from the Information Management Division and is currently using PC ARC/INFO software. Later this year DNR will be upgrading by using the DOT MicroVAX computer. DNR will propose further upgrades in the future.

Coordination Activities

Wisconsin is somewhat unique in the nation because coordination efforts have focused on improved land recordation primarily at the county level. The University has taken a strong lead for over a decade to develop a related program with grant funding for counties. These efforts led to an Executive Order in 1985 that established the Wisconsin Land Records Committee (WLRC). The 32 member committee, whose membership represented local elected official officials, state departmental personnel and appropriate private industries, submitted its summary reports in October of 1986. The Wisconsin Land Information Association (WLIA) was organized as recommended by the Wisconsin Land Records Committee in its final report prepared in 1987. Its members are "professionals and organizations committed to modern land information management." The group has over 100 members that have been active in sponsoring conferences, drafting legislation and serving as a network and forum for the state.

Legislation was adopted in 1989 to establish a Land Information Board and for the Land Information Program, but the program was unfunded. Members of the Board include four people, or designees, from each of these state agencies: Secretaries of Administration; Agriculture, Trade and Consumer Protection; DNR and DOT; as well as from local governments; and public utilities and private businesses. Advisory members include the State historic preservation officer, the Secretary of Revenue, and the State Geologist, other representatives of local and regional governments, and of federal agencies.

The mission of the Land Information Board was to "direct and supervise the land information program and serve as the state clearinghouse for access to land information," including the provision of technical assistance and advice to state agencies and local government agencies, and the maintenance and distribution of an inventory of land information. A report was required by March 1990, and biennially thereafter, from virtually all state agencies to include "a plan to integrate land information to enable such information to be readily translated, retrievable, and geographically referenced for use by any state, local government unit or public utility." The basic idea is not to mandate anything, but to encourage good practices through the Board and its grant activities. One staff position is authorized for one year to provide staff services for the program. Efforts were successful in the 1990 legislative session to fund the Land Information Program.

WYOMING

Department of Administration
Division of Research and Statistics
Emerson Building, 2001 Capitol, Room 327E
Cheyenne, WY 82002
Contact: Mary Byrnes, Director
(307) 777-7505

Technology Infrastructure

GIS use in Wyoming began in 1985 in the State Engineer's Office. This department was charged with the development of an information base to meet the needs of a large law suit, the Big Horn Water Adjudication. A method was needed to determine the use of water for irrigation on certain agricultural lands. Based on informal coordination activities underway at the time, a cooperative agreement was arranged for the State Engineer's Office to use the U.S. Geological Survey Water Resources Division's ARC/INFO software on a Prime computer located in Cheyenne, with a terminal located in the State Engineer's Office.

Coordination Activities

Wyoming has a long but sporadic history of coordinating its geographic information activities. A State Mapping Advisory Committee (SMAC) existed over thirty years ago. It was authorized in the statutes and existed until 1980, but it was deleted from the state statutes in 1982. An informal coordination activity began in 1985 resulting in an ad hoc coordination group of state agencies. A survey of state, federal and private entities in the state was conducted by the Governor's Planning Coordinator's Office. Information exchange and educational meetings were also held among state and federal officials. of state agencies.

Interest in coordination resurfaced again in 1988 and a request was made to fund a position in the State Planning Coordinator's Office in 1989 to help build some coordination of GIS related activities, but the proposal was not funded. It was informally concluded that the Department of Fiscal Control (DAFC) should have a coordination role since the state's data processing capabilities and census data center are located there.

At the same time, the University of Wyoming has been interested in developing GIS capabilities. In the fall of 1988 the University formed an ad hoc GIS committee to explore the possibilities of investing University resources in a GIS, to be housed at the University Graphics and Image Processing Center (GRIPC). The GRIPC is a research facility designed to investigate computer vision, graphics, image processing and GIS. A committee of university and state representatives was organized and the group met through 1989 and early 1990 to discuss issues, hear presentations, and visit various GIS sites. In August 1989, the University authorized funding to conduct a needs assessment of GIS in Wyoming. Mary Byrnes is informally serving in a coordination role for the state.

INDEXES

About the indexes

The indexes have been developed to provide an overview of hardware and software used for geographic information systems on a nationwide basis. About half the states use more than one type of software and hardware for GIS activities.

Hardware

Prime computers are the most popular type of hardware for GIS activities. In all, there are at least 9 types of Prime computers used for GIS. The Prime 9955, used by 7 states, is the most common. A few states did not indicate the type of Prime computer used, so these systems are listed separately in the index. Other popular hardware systems include Sun Microsystems workstations (7 states), DEC VAX (6 states) and DEC MicroVAX (5 states). The survey revealed that there are at least 13 types of hardware used for GIS activities throughout the country. A few states did not have information about hardware.

Software

ARC/INFO is the most popular software, used by a total of 42 states (used as the sole GIS software in 15 states). Other popular GIS software includes PC ARC/INFO (used by 18 states) and ERDAS (11 states). In all, there are 23 types of software currently being used for GIS activities throughout the country. Only one of the 52 governments surveyed (Virgin Islands) does not have any geographic information systems in use at the present time, but projects under development.

Hardware

AT&T
Texas
Vermont

Data General
Alaska
Connecticut
Kansas

DEC VAX
Alaska
Massachusetts
Mississippi
Nebraska
Ohio
Vermont

IBM Mainframe
Maryland
New Jersey
North Carolina
Utah
Vermont

Intergraph
Louisiana
Michigan
North Dakota
Pennsylvania

MicroVAX
Idaho
Nebraska
New Mexico
Puerto Rico
Wisconsin

Prime 750
Illinois

Prime 2655
Oregon

Prime 2755
Illinois
Indiana
Missouri
Montana

Prime 4150
Utah

Prime 6550
New Hampshire

Prime 9650
Illinois

Prime 9750
Colorado
New York
Tennessee

Prime 9955
Illinois
Kentucky
Minnesota
New Jersey
Rhode Island
Virginia
Washington

Other Prime
California
Georgia
Virginia
South Dakota
Wyoming

SUN Workstations
Alaska
Connecticut
Maine
New York
North Carolina
Oregon
South Carolina

Tektronix Workstations
Delaware
Massachusetts
Montana

IBM PCs/other microcomputers
Alabama
Idaho
Florida
Massachusetts
New Jersey
New York

Other hardware
Apollo: Wisconsin
Gould: Florida

Software

ARC/INFO
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Hawaii
Idaho
Illinois
Indiana
Kansas
Kentucky
Maine
Maryland
Massachusetts
Minnesota
Mississippi
Missouri
Montana
Nebraska
New Hampshire
New Jersey
New Mexico
New York
North Carolina
Ohio
Oklahoma
Oregon
Rhode Island
South Carolina
South Dakota
Tennessee
Texas
Utah
Vermont
Virginia
Washington
Wisconsin
Wyoming

ELAS
Florida
Illinois
Kentucky
Nebraska
New Mexico
Utah
Vermont

EPPL-6/EPPL-7
Iowa
Minnesota
Nebraska
Tennessee
Utah

ERDAS
Alabama
Florida
Illinois
Kansas
Michigan
Mississippi
Montana
Nebraska
New Jersey

North Carolina
Tennessee

Intergraph
Louisiana
Michigan
North Dakota
Pennsylvania
Wisconsin

NETWORK
Kentucky
North Carolina

PC ARC/INFO
Alabama
Connecticut
Idaho
Iowa
Kansas
Massachusetts
Minnesota
Missouri
Nebraska
Nevada
New Hampshire
Ohio
South Dakota
Tennessee
Texas
Virginia
West Virginia
Wisconsin

TIN
Georgia
Kentucky
North Carolina

Other Software
AutoCAD: Alaska
DTAP-Terrain: Utah
GRASS: Nebraska
GRID: Illinois
Informap II: Puerto Rico
Infoplot: Puerto Rico
ISM: North Carolina
Minitab: Kentucky
MOSS: Nebraska
Oracle: Massachusetts
pMAP: Nebraska
SAGIS: Nebraska
SPANS: Nebraska
Specially designed: Ohio
T-NET: Massachusetts